

NUNAM IQUA



2004 D. Kenrick

HAZARD MITIGATION PLAN 2008

Prepared by the Nunam Iqua Advisory Planning Board

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1.0 EXECUTIVE SUMMARY

In 2004, an October storm surge flooded Nunam Iqua. A State and Federal disaster was declared. The incident made apparent the need for a community hazard mitigation plan. Understanding that hazards are not mutually exclusive (more than one can happen at a time, and one disaster can lead to another), the Nunam Iqua Advisory Planning Board, working with the local residents, identified and prioritize those hazards posing the greatest threat to Nunam Iqua.

Hazards that threaten Nunam Iqua

#1 Severe Weather which includes High Winds, Thunder Storms, Coastal Storms, and potentially the greatest threats of Storm Surge and Ivu (ice coming ashore). The most recent State and Federal Disaster declaration was due to fall flooding in 2004, caused by a storm surge.

#2a. Landslide which includes ground failure caused by Permafrost freezing or thawing in response to general climate changes and human activity. Permafrost is found throughout Nunam Iqua. Global warming will result in a loss of permafrost and release of frozen underground moisture, causing the land to sink and become more susceptible to flooding. All existing foundations, gravel roads, and utilidors in Nunam Iqua will experience disruption.

#2b. Erosion, the wearing away, transportation, and movement of land, includes the subcategories of Coastal Erosion, and Riverine Erosion. Due to its location on Kwemeluk Pass six miles from the Bering Sea, Nunam Iqua is subject to erosion from incoming and outgoing tidal waters, wave action, river current, and melting permafrost.

#2c. Technological Disaster which includes infrastructure failure, hazardous materials, as well as critical facility structural fires. A major oil spill or prolonged infrastructure failure, such as a power outage, would have a disastrous effect on the operation and maintenance of critical facilities providing for the health and welfare of community residents.

#3. Wildfire includes Wildland-Urban Interface Fires that spread into a community and result in Structural Fires. Nunam Iqua is an isolated community with no organized firefighting capability. Any fire burning into the community has the potential for extremely dangerous and complex fire burning conditions which pose a threat to the public and firefighter safety.

#4. Economic Disaster which can result from a natural disasters, like the collapse of commercial salmon fishing in the Lower Yukon in 2000. Nunam Iqua also faces difficulty in securing the broad based Economic development needed for sustainability due to a poor quality of life issue. A large number of unsolved robberies have resulted in a high crime rate. Inadequate public safety protection has discouraged local private enterprise.

The Nunam Iqua Hazard Mitigation Plan attempts to address these specific hazards with the following mitigation goals:

GOAL #1: Protect existing facilities, buildings, utilities, boardwalks and gravel roads

GOAL #2: Develop recommendations for future construction

GOAL #3: Improve Emergency Response

2.0 SUPPORT RESOLUTIONS

3.0 PLANNING PROCESS

3.1 Hazard Plan Methodology

Hazard Identification: The Local All-Hazard Mitigation Plan Template (provided by the Division of Homeland Security & Emergency Management to assist communities in preparing a mitigation plan) was used as a guideline, as were sample FEMA approved mitigation plans from nearby communities. Using these hazard profiles provided from these sources, the Nunam Iqua Advisory Planning Board (NIAPB) discussed each one and identified if and how the hazard posed a threat to Nunam Iqua. The public provided input to these discussions during meetings and answering survey questionnaires. Elders were contacted for their memories of past events.

Hazard Vulnerability: The NIAPB reviewed the community consensus of which potential hazards threatened Nunam Iqua. Estimating hazard probability, magnitude or severity, the amount of warning time the community could expect, and the duration of each hazard, the top six hazards were determined. The prioritized hazards were presented to the public for approval.

Capability and Inventory Assessment: Legal and technical community resources were reviewed and administrative capabilities assessed. Local resources were inventoried and reviewed, including existing plans, ordinances, and regulations. State and federal funding sources were identified. Information and GPS location of all residences, community facilities, transportation systems, utilities, boardwalks, and bulk fuel storage tanks was collected. Community structures were classified as to type. The NIAPB designated whether structures should be considered critical, essential, or non-critical.

Vulnerability Analysis: The potential loss in dollars for each hazard was determined based on the total value of residences, facilities, and other structures. First the NIAPB identified the Structural Values for all facilities by contacting original contractors where possible and requesting the cost estimate for replacement in current dollars. Replacement cost on older facilities takes into account the need to abide by new state and federal regulations regarding construction. The Contents were calculated as a percentage of the Structural Value, with the percentage dependent upon the classification of the facility. Percentages were derived from the FEMA HAZUS-Multi-Hazard software program. The Functional Value of a facility was determined to be equal to the total of the Structural Value plus the Contents. Once the Community Functional Value for all facilities was calculated, each of the priority hazards were evaluated by the NIAPB as to the percentage of population and percentage of facilities potentially affected to determine the anticipated loss.

Mitigation Strategy: Local Hazard Mitigation Goals were identified and specific strategies were discussed that would help reduce or avoid long term risk or damage. The strategies were then listed as separate actions with an initial project scope defined and the responsible entity identified. The actions were then reviewed with consideration given to community support, technical feasibility, environmental impact, and legality, as well as administrative ability and resulting community benefit. Ranking was by consensus. Project scope was determined to be short term or long term with responsible entity and funding sources identified.

Plan Maintenance: The NIAPB remains responsible for monitoring the Nunam Iqua Hazard Mitigation Plan and will require that each December, the NIAPB, City, and Tribe will report on the implementation of mitigation actions. An Update of the plan will be done in conjunction with the Nunam Iqua Strategic Plan for Comprehensive Development in 2010, and then every 5 years thereafter.

3.2 Public Planning Process

Hazard Mitigation became an active topic in community discussions in 2005, after a Storm Surge flooded the community and triggered disaster declarations by the State and Federal government. In Nunam Iqua, comprehensive planning, flood protection and counter measures, erosion control and other matters which affect the health, safety, and well being of the residents are responsibilities of the Nunam Iqua Advisory Planning Board. The Advisory Planning Board prepares and makes recommendations to the City Council, Tribal Council, Corporation Board, and Advisory School Board that may be adopted, rejected or amended.

The Nunam Iqua Advisory Planning Board (NIAPB) was established in 2001. The members include a representative from the Nunam Iqua City Council, the Nunam Iqua Traditional Council, the Swan Lake Corporation, the Sheldon Point Advisory School Board, the residents, and the community's youth, as well as the Swan Lake Corporation Land Planner. In 2008, a representative of the Yukon Delta Fisheries Development Association (YDFDA) was added to the board. Entity representatives are appointed by their boards or councils for one year terms. The resident, youth, and YDFDA representatives are selected by the appointed members after the November election, and the Land Planner is a Corporation employee.

3.2.1 Public Involvement

To prepare the Nunam Iqua Hazard Mitigation Plan, NIAPB members held a series of public meetings, work sessions, survey questionnaires, and discussed the topic at Community "Get-Togethers". This method was to assure participation by as many members of the community as possible.

1. All meeting announcements were posted and the public invited to attend.
2. The questionnaire was handed out door to door, with the offer of translation, reading, and writing assistance.
3. Community members were informed of the Get-togethers by signs posted in advance, follow-up VHF announcements in Yupik and English.

- **8-17-2005 Community Get-Together**

Summary from the minutes: Hazards: The Public listed, for NIAPB review, the disasters they felt threaten to Nunam Iqua and ranked them as follows: Flood and Erosion as the number one concern, then Fire, Earthquake, Hazardous Materials, and High Winds. Mitigation suggestions by the community were to encourage everyone to monitor the radio for weather updates.

- **11-22-2005 NIAPB Meeting**

Summary from the minutes: City of Nunam Iqua decided to apply for a grant to fund a Mitigation Plan. The next Questionnaire was to ask the community to help rank disaster threats and vote on NIAPB mitigation suggestions.

- **07-12-2006 NIAPB Meeting**

Summary from the minutes: Mitigation Plan Grant funded. Discussions on what to do in case of emergencies regarding floods and other local hazards. Hazards were prioritized by board members.

- **07-26-2006 NIAPB Special meeting**

Summary from the minutes: NIAPB planned to distribute a Questionnaire and discussed topics to be addressed. A space for residents to make individual comments was to be on the questionnaire.

- **08-24-2006 Community Get-Together**

Summary from the minutes: Questionnaire results: James O'Malley read the results. Tsunami, flooding, and fire were considered the most dangerous, with the most important hazard facing Nunam Iqua fall flooding with water and/or ice. The community supported writing laws to help protect the village from hazards and supported Emergency Response for the community. The Native Village of Sheldon Point was selected to coordinate response.

Historical disasters-Eugene Pete Sr., a well respected elder, talked about a fall flood that happened many years ago with high winds in the Black River area. An Ivu pushed the ground up into high mounds now covered with willows. It was so windy it was necessary to crawl. Flooding stopped when the winds died. Edward Adams, Sr. spoke of the ground sinking, how the roof of the old High School can no longer be seen from a distance, and that someday the town may need to be relocated. Daryl Manumik talked about the need for erosion control. Paul Manumik, Sr. described the Kotzebue seawall of chain link cinderblocks, recommending the Army Corps of Engineers as a possible funding source.

Prevention measures- Discussion noted that a warning system is needed. The new UUI weather station in Bethel could send disaster warnings so people can prepare for flood. Edward Adams Sr. said that the Native Village of Nunam Iqua will form an emergency response team at the Tribal meeting. Daryl Manumik said that VHF's have WAX 1 weather stations. Travelers were encouraged to listen to the radio before traveling in the fall time and people with satellite TV could call the Tribal office if they hear flood warnings. Segundo Strongheart requested an administrative person be designated to help resident with any disaster related paperwork.

- **01-18-2007 NIAPB Work Session**

Summary from the minutes: Critical Facilities were discussed and designations were made by NIAPB members.

- **11-21-07 NIAPB Special Meeting**

Summary from the minutes: NIAPB members reviewed the progress made on the Hazard Mitigation Plan. The definitions of individual hazards were reviewed. The specific effect on Nunam Iqua by each of the hazards was summarized and then ranked using risk assessment criteria. Data on hazard effects on critical and essential facilities was to be completed and turned in on November 23, 2007. Work session scheduled for December 12, 2007.

- **07-12-12 NIAPB Work Session**

Summary from the minutes: NIAPB members reviewed and approved the ranking results for Hazards in Nunam Iqua and then made recommendations for mitigations measures.

- **01-31-08 NIAPB Meeting**

Current Draft of the Hazard Mitigation Plan presented to the public. Comments incorporated.

- **02-27-08 NIAPB Workshop**

The following charts were reviewed and approved: Facility Structural Value Chart, the Facility Functional Value Chart, the Residential Structural Value Chart, the Residential Functional Value Chart and the Community Functional Value Chart. The Anticipated loss chart was amended to include the potential loss of the airport due to erosion. Mitigation actions were prioritized. The final document was to be submitted to the Tribal and City governments for final recommendations and/or approval.

3.2.2 Nunam Iqua Advisory Planning Board Members

2005

NAME	ENTITY	OFFICERS
Mary Stuart	Resident Representative	Chairman
Edward Adams, Sr.	Native Village of Nunam Iqua	
Alan Peter	City of Nunam Iqua	
Roger Canoe	Advisory School Board	
Frank Camille	Swan Lake Corporation	
Andrea Charlie	Youth Representative	
James O'Malley	Swan Lake Corporation Land Planner	Vice-Chairman

2006

NAME	ENTITY	OFFICERS
Mary Stuart	Resident Representative	Chairman
Frank Camille	Native Village of Nunam Iqua	
Edward Adams, Sr.	City of Nunam Iqua	
Roger Canoe	Advisory School Board	
Dominica Strongheart	Swan Lake Corporation	
Andrea Charlie	Youth Representative	
James O'Malley	Swan Lake Corporation Land Planner	Vice-Chairman

2007

NAME	ENTITY	OFFICERS
Segundo Strongheart	Resident Representative	
Edward Adams, Sr.	City of Nunam Iqua	
Joseph G. Strongheart	Native Village of Nunam Iqua	
Alvin Owletuck	Advisory School Board	Vice-Chairman
Dominica Strongheart	Swan Lake Corporation	Chairman
Vanessa Hunter	Youth Representative	
James O'Malley	Swan Lake Corporation Land Planner	Secretary Treasurer

2008

NAME	ENTITY	OFFICERS
Segundo Strongheart	Resident Representative	Secretary Treasurer
Edward Adams, Sr.	City of Nunam Iqua	
Roger Canoe	Advisory School Board	Vice Chairman
Dominica Strongheart	Native Village of Nunam Iqua	Chairman
John Strongheart	Youth Representative	
James O'Malley	Community Land Planner	
Paul Manumik Sr.	Swan Lake Corporation	
Stanley Pete.	YDFDA Yukon Delta Fisheries Development Assoc.	

3.3 Other Party Involvement

In February 2008, a draft copy was reviewed by the Division of Homeland Security with a request for guidance. After recommendations were incorporated, an improved draft of the plan was approved by the City and Tribal governments. The draft was then sent to the neighboring communities of Alakanuk, Emmonak, and Kotlik, as well as Calista (the regional for-profit), the Association of Village Council Presidents (the regional non-profit), the Division of Community Advocacy, the Rural Utilities Business Advisory Program, and the Department of Fish and Game, with a request for comment within 20 days. A final draft was completed by the Nunam Iqua Advisory Planning Board and approved by resolution by the City and Tribal Governments.

3.4 Existing Plans, Studies, and Reports

Available to and utilized by the Nunam Iqua Advisory Planning Board in development of the Nunam Iqua Hazard Mitigation Plan were the following:

Comprehensive Plans

Nunam Iqua Strategic Plan for Comprehensive Development 2005(NIAPB) and Nunam Iqua Long Range Transportation Improvement Plan 2008 (NIAPB).

Mitigation Plans

Local All-Hazard Mitigation Plan Template (DHS&EM), The City of Aniak, AK All- Hazards Mitigation Plan 2005 (Bechtol Planning and Development), The City of Hooper Bay, Alaska Local Hazards Mitigation Plan 2006 (ASCG Inc./ Bechtol Planning and Development), and The City of Alakanuk Hazard Mitigation Plan (URS), The Alaska State Hazard Mitigation Plan 2004 (DHS&EM), City of Nome Hazard Mitigation Plan 2003 (Bechtol Planning and Development).

Maps

Airport Improvement 2005 (DOT&PF), Erosion Map 1951-2001(DOT&PF), Future Land Use Map (NIAPB), Graveyard Location Map (NIAPB), Native Allotment Map 2005(DOT&PF), Survey Aerial Basemap 2003, Wetland Habitat Map 2005(DOT&PF), Aerial map 2004(DOT&PF), and the Community Profile Map 2007 (YDFDA and DCCED).

Studies: Causeway Feasibility Study 2002 (CE2 Engineers), Nunam Iqua 2002 Archaeological Survey (Walking Dog Archeology), Causeway Conceptual Plan 2005(CE2 Engineers), Nunam Iqua Water/Sewer Improvements Plan Update 2006(CE2 Engineers and NIAPB), Wetland Delineation Report 2005 (DOT&PF), Airport Geotech Report 1993(DOT&PF), and Causeway and Lagoon Soils Investigation 2001(Duane Miller & Associates).

Environmental Assessments

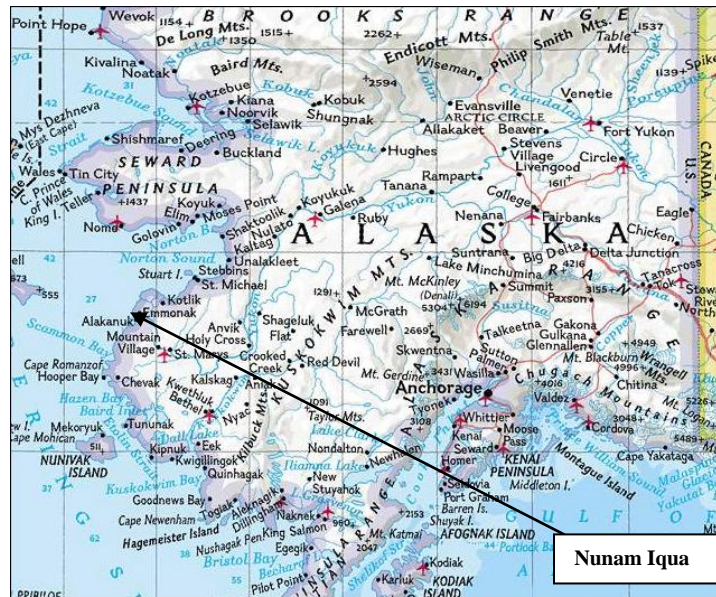
Airport Improvement Project 2005 (DOT&PF), Causeway 2004 (CE2 Engineers), and NIEC Powerplant/ Powerline Project 2007 (NIAPB).

Books

When Our Bad Season Comes A Cultural Account of Subsistence Harvesting and Harvest Disruption on the Yukon Delta, Ann Fienup-Riordan, AURORA Alaska Anthropological Association Monograph Series #1, 1986. Memoirs of a Yukon Priest, Segundo Llorente, Georgetown University Press, Washington D.C. 1990

4.0 COMMUNITY PROFILE

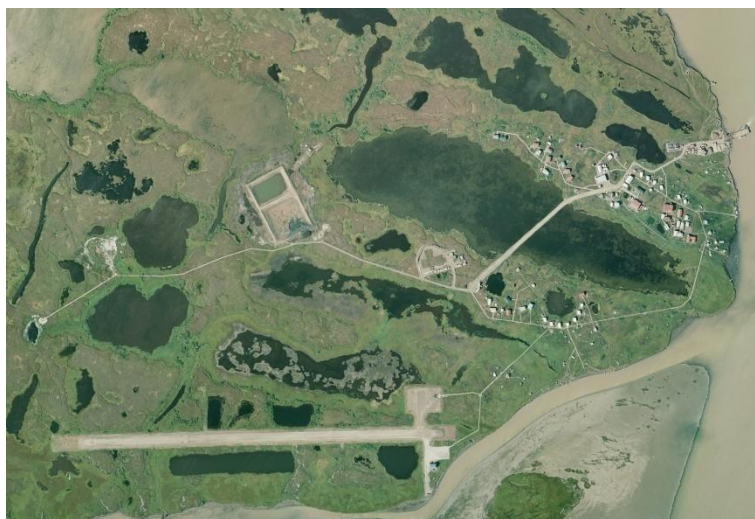
Nunam Iqua, formerly known as Sheldon Point, is located on the south fork of the Yukon River in the Yukon-Kuskokwim Delta, an alluvial plain built up on deposited silts, sands, and gravel. Nunam Iqua was historically the location of summer fish camps and became a city in 1974. The population, 201, remains 96% Yupik Eskimo. Village soil is predominately tundra wetland with numerous ponds and slough channels. The City of Nunam Iqua is in the Bethel Recording District (Township 28N, Range 84W, Seward Peninsula) and occupies 13.2 square miles of land and 5.3 square miles of water.



Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

For further information about history, topography, soils, climate, flood, fish, and wildlife, see Appendix B; for demographics and economy see Appendix C.

Nunam Iqua Vision Statement: A small quiet community of family, relatives, and friends working together pursuing to live our Yupik way of lifestyle with respect to our surrounding land and waters for subsistence. Respecting our elders wisdom, knowledge, values, and our Yupik practices, at the same time pursuing higher education and training with the goal of good jobs, leadership, controlled but steady development of infrastructure and economy for betterment of lives with meaningful activities for our elders, young adults, parents, and their children.



2006 Aerial photograph of Nunam Iqua

Buildings and residences in Nunam Iqua are located on the north and south sides of Swan Lake, a two foot deep tundra pond (3400 feet long x 800 feet wide). A gravel causeway, completed in 2008, connects the north and south sides of the community.

There are 48 houses (including teachers housing) and 36 critical or essential facilities. Community wide water and sewer is currently under construction, as well as a new school.

5.0 GOVERNMENT AND ENTITIES

Government

TRIBAL: Native Village of Sheldon Point

Box 27

Nunam Iqua, Alaska 99666

Phone: (907) 498-4911 Fax: (907) 498-4773

Position	Name	Term
President	Edward Adams Sr.	2008
Vice-President	Dominica Strongheart	2009
Member	James O'Malley	2008
Member	Joseph P. Strongheart	2009
Member	Roger Canoe Sr.	2009
Administrator	Rose Raphael	N/A

CITY: City of Nunam Iqua

Box 26

Nunam Iqua, AK 99666

Phone: (907) 498-4226 Fax: (907) 498-4250

Position	Name	Term
Mayor	Edward Adams Sr.	2008
Vice-Mayor	Edward Abraham Jr.	2010
Sec/Treas	Segundo Strongheart	2009
Member	Joseph P. Strongheart	2009
Member	Dominica Strongheart	2008
Member	Andrea Charlie	2008
Member	James O'Malley	2010
Administrator	Esther Manumik	N/A

Local Corporation

Swan Lake Corporation

Box 25

Nunam Iqua AK 99666

Phone: (907) 498-4227 Fax: (907) 498-4242

Position	Name	Term
Chairman	Paul Manumik, Sr.	
Vice-Chairman	Dominica Strongheart	
Sec/Treas	Ursula Canoe	
Member	Cyril Murphy	
Member	Joseph Afcan	

Regional Organizations

- School: Lower Yukon School District
- For Profit Corporation: Calista
- Non-Profit: Association of Village Council Presidents
- Housing Authority: Association of Village Council Presidents Regional Housing Authority
- CDQ Group: Yukon Delta Fisheries Development Association
- Native Health Provider: Yukon Kuskokwim Health Consortium

For Regional organization contact information see Appendix D

6.0 RISK ASSESSMENT

Categories and descriptions of the specific hazards that affect communities throughout the State of Alaska are detailed in Appendix A-1 thru A-10 (from the Local All-Hazard Mitigation Plan Template, provided by the Division of Homeland Security & Emergency Management to assist communities in preparing a mitigation plan). The State of Alaska All Hazard Mitigation Plan identifies the presence of these specific hazards within the state by jurisdiction (Nunam Iqua lies in the Wade Hampton Census Area). Utilizing the definitions and likely presence, each hazard was addressed and determinations made as to how it posed a threat to Nunam Iqua. Hazards identified in this plan are not mutually exclusive and may happen in combination. With each hazard identified as to how it potentially threatens Nunam Iqua, the Nunam Iqua Advisory Planning Board (NIAPB) attempted to prioritize the hazards using the following criteria:

6.1 Scoring System

Probability	Magnitude/Severity	Warning Time	Duration
4-Highly Likely	4-Catastrophic	4- Less than 6 hours	4- More than 1 week
3-Likely	3-Critical	3- 6-12 hours	3- Less 1 week
2-Possible	2-Limited	2- 12-24 hours	2- Less than 1 Day
1-Unlikely	1-Negligible	1- 24+ hours	1- Less than 6 hrs.

Assigning points (1-4) in each category, and weighting these categories by their importance (Probability was weighted 45%; the magnitude/severity 30%; warning time 15%; and duration 10%), the priority risk factor for each hazard was determined. The higher the priority risk factor, the greater the hazard for Nunam Iqua. The Hazard Risk Matrix details the results:

6.2 Hazard Risk Matrix

Hazard (identified in Nunam Iqua)	Probability	Magnitude/ Severity	Warning Time	Duration	Priority Risk Factor
Weather (High winds, Coastal Storm, Storm Surge, Thunderstorms)	Highly Likely	Catastrophic	< 6 hours	<One week	3.45
Landslides (Permafrost)	Highly Likely	Negligible	24+ Hours	>One week	2.65
Erosion (Riverine/Coastal)	Highly Likely	Negligible	24+ Hours	>One week	2.65
Technological (Power Outage/ Hazardous Spill)	Possible	Catastrophic	< 6 hours	>One week	2.65
Wildland Fire (Urban interface/smoke)	Possible	Critical	< 6 hours	>One week	2.35
Economic (Crime Rate)	Possible	Critical	24+ Hours	>One week	2.35
Biological (Epidemic)	Unlikely	Critical	24+ Hours	>One week	1.9
Flooding (spring ice jam)	Possible	Negligible	24+ Hours	<One week	1.65
Earthquake	Possible	Negligible	< 6 hours	<One day	1.55
Volcano (Ash)	Unlikely	Negligible	24+ Hours	>One week	1.3
Drought	Unlikely	Negligible	24+ Hours	>One week	1.3

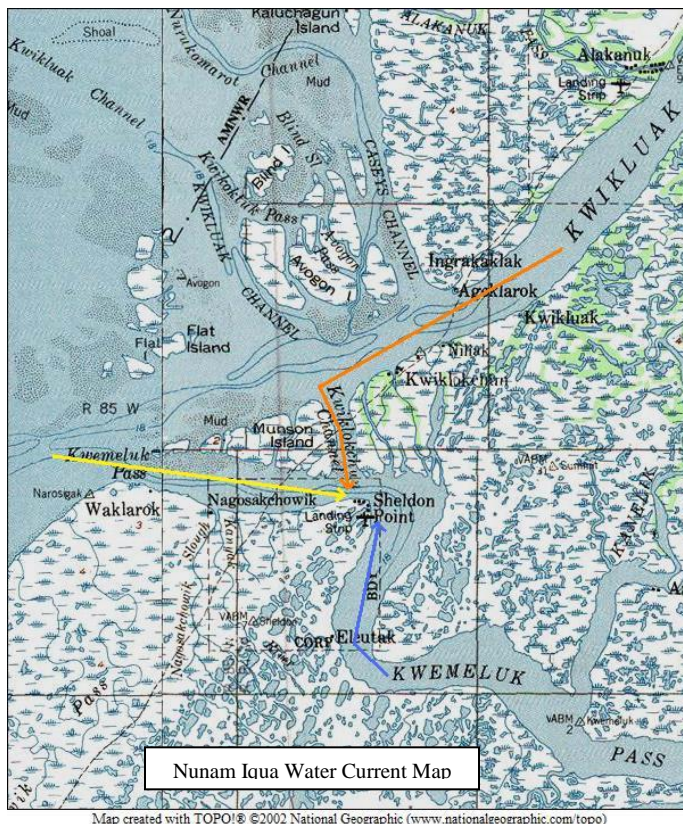
6.3 Hazards Ranked by Priority

1	Severe Weather (High Winds, Thunderstorms Coastal Storms, Storm Surge, Ivu)
2a	Landslide (Permafrost)
2b	Erosion (Riverine/Coastal)
2c	Technological (Power outage/Hazardous Spill)
3a	Wildland Fire (Urban interface/smoke)
3b	Economic (Crime Rate)

6.4 Priority Hazard Profiles

6.4.1 Severe Weather

Hazard Description: Severe Weather is subdivided into Winter Storms, Heavy Snow, Extreme Cold, Ice Storms, Aufeis, High Winds, Thunder Storms, Hail, Coastal Storms, Storm Surge, and Ivu (See Appendix A-7). Nunam Iqua is affected by the potential hazard of Severe Weather resulting from **High Winds, Coastal Storms, Storm Surge, Ivu, and Thunder Storms.**



How the Severe Weather patterns manifest is dependent upon the geography and topography of the land. Nunam Iqua lies 6 miles from the coast of the Bering Sea on a point of land and is subject to the influence of three bodies of water: The Yukon River, Kwemeluk Pass, and the Bering Sea.

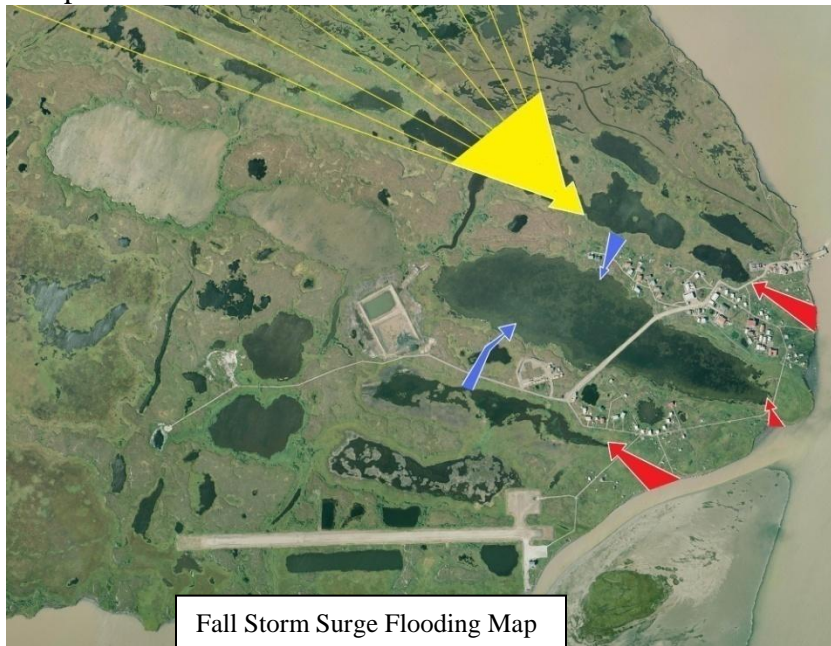
The Yukon River empties into the Bering Sea. The Southern mouth of the Yukon River is Kwikluak Pass. As Yukon River water flows out Kwikluak Pass, it flows south into Kwiklokchun Channel, on the east side of Munsen Island. The direction of this water is indicated in Figure 3 with a red arrow. Kwiklokchun Channel joins Kwemeluk Pass at Nunam Iqua. As shown by the yellow arrow on the Nunam Iqua Water Current Map, tidal waters from the Bering Sea also flow into (and out) of Kwemeluk Pass in front of Nunam Iqua. On higher than normal tides, the water in front of the

village is salty. Kwemeluk Pass, as shown by the blue arrow, flows out to the Bering Sea bringing water from the sloughs and land drainage past Nunam Iqua. Nunam is located at the confluence of these three water sources. Weather conditions that affect the Yukon River, Kwemeluk Pass, or the Bering Sea have an effect on Nunam Iqua.

High Winds (in excess of 60mph) occur rather frequently over the coastal areas along the Bering Sea. Low pressure cyclones develop in the Bering Sea and are brought by wind systems in the upper atmosphere. When these storms impact the shoreline they often bring high winds. High wind season usually begins in August. During the winter, these high winds combined with loose snow produce blinding blizzard and dangerous wind chill temperatures.

Due to its location, Nunam Iqua is exposed to **Coastal Storms**. When strong winds come from south and move clockwise to the southwest and west, the chance for a **Storm Surge** with coastal flooding is dramatically increased. Coastal flooding can cause significant shoreline erosion as flood waters undercut roads and other structures. During the months of August, September, October, and November, Nunam Iqua is historically at greatest risk for coastal flooding.

When shorefast ice forms and thickens along the coast, the risk of coastal flooding abates. A Storm surge occurs when the sea is driven inland above the high tide level onto land that is normally dry. With the right combination of wind direction and strength, a storm surge in the fall can break up shorefast ice and push it ashore, resulting in an **Ivu**. Should this happen, the results would be catastrophic for the community. Ice is hazardous for buildings on pile foundations above flood level. Even thin ice can cut through heavy timbers under the right conditions. After the water thick with ice moves through the community, the amount of debris left behind can be extensive and compromise operation of critical facilities, as well as emergency transportation.



During a **Storm Surge**, the high water in Kwemeluk Pass flows over the river bank, into the village as shown by the **red arrows** in the Fall Storm Surge Flooding Map. Low lands are subsequently filled similar to Nunam Iqua Spring Flooding Map. Once the lowlands fill, the water flows back into Swan Lake as shown by the **blue arrows**. Storm surges resulting from the clockwise movement of wind towards the southwest or west displace the greatest volume of water. Rising water under these conditions

can cover all of the land such that the current of incoming water is from a southwest or west direction as shown by the **yellow arrow**. The total mass of land subject to flooding is dependent upon the volume of water in the storm surge. The potential exists that the entire community could flood from a storm surge of extreme magnitude. Debris left behind from flooding would impede the community's ability to recover.

Flooding due to coastal storms and storm surge can also bring salt water from the Bering Sea into Kwemeluk Pass. Continued wind pressure from the southwest and west will keep these tidal waters from receding at low tide. Until the winds switch direction or stop, Bering Sea salt water can remain pooled in front of Nunam Iqua. The water source for Nunam Iqua is Kwemeluk Pass. Water cannot be treated for consumption at the waterplant if the salt present increases the Total Dissolve Solids above the 500mg/l threshold. When traditional sources of fresh water, from ponds and lakes, become contaminated, and water cannot be processed, the community must resort to using bottled water. Once salt water has covered the land the effects last until spring as the early melting creates a potential hazard for travelers.

Thunderstorms develop due to a combination of atmospheric instability and moisture triggered by surface heating from the sun. A pulse storm, typical in Alaska, may produce brief high winds, hail, or weak tornadoes. Isolated tornadoes with hail have been observed near Nunam Iqua in August and September. Cloud to ground lightening strikes during a thunderstorm are a potential source of wildfire on dry tundra and grasslands.

Previous Occurrences: Historically there are written accounts of fall flooding by explorers and ethnographers. Edward Nelson (1887) wrote of the severity of fall flooding. Petroff (1884) described the effect of the south wind on the tides. Fox (catholic missionary) described major flooding on Thanksgiving and again on December 8, 1931, at Akulurak on Kwemeluk Pass. Elders repeat stories of the threat posed by storm surges in the fall, especially when there is ice. Buildings first appeared at Nunam Iqua after the 1931 fall flooding wiped out the saltry and store on the other side of Kwemeluk Pass. These fall floods often destroyed the food supplies and affected the ability to harvest food from the land. In 1931, starvation was particularly acute. Another major fall flood was reported by an elder and estimated to have taken place in 1946. The flood of record used by the US Army Corps of Engineers occurred in 1972. Data from this flood was used to determine that to meet federal standards, all structures must be elevated to 8' Mean Sea Level (MSL). In October 2004 a storm surge brought water into the village and contaminated traditional sources of drinking water. In September 2005, there was less significant flooding though water surrounded the tank farm and reached the Community Hall.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having Weather hazard present in the jurisdiction but the probability is unknown. The NIAPB ranked Severe Weather as Highly Likely and the potential magnitude and severity as Catastrophic.

Anticipated Loss:

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Severe Weather	100%	100%	100%	\$76,589,647	\$114,795,359

See Section 9.0 Vulnerability Analysis for details

Mitigation Strategies for Severe Weather (which includes High Wind, Thunderstorm, Coastal Storm, Storm Surge, and Ivu)

Goal: Protect existing facilities, buildings, utilities, boardwalks, and gravel roads

- Locate safe fall storage area for barged construction materials

- Support relocation, elevation, or otherwise flood proof properties vulnerable to flooding.

Goal: Develop recommendations for future construction

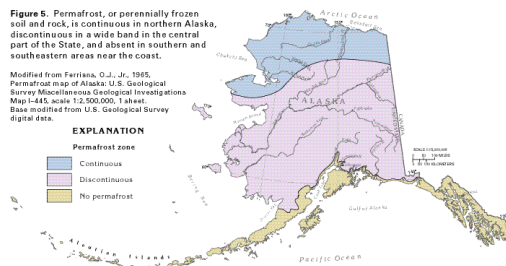
- Mitigate damage on road drainage and water sewer utilities by requiring reconstruction to be a higher standard after the storm
- Secure public health and welfare with additional water storage tank
- Develop land use planning policies

Goal: Improve Emergency Response

- Develop emergency response plan with an early warning system and designated command center (Hold practices with emergency response equipment, begin preliminary planning, secure funding for development of emergency response plan Study Storm ready guidelines)
- Improve post-disaster response by designating one entity to assist residents with post disaster paperwork
- Educate public on dangers (Document any flooding in Nunam Iqua with video for public education and research the National Flood Insurance Program)
- Increase recruitment, incentives, and training for emergency response personnel (including CPR training, Code Red training and Firefighting training)

6.4.2 Landslides

Hazard Description: The principal types of Landslides are classified by the type of movement: Falls, Topples, Lateral Spreads, Slides, and Flows (See Appendix A-8). Ground failure can also be caused by Permafrost freezing or thawing in response to general climate changes and human activity.



The village of Nunam Iqua is located in Discontinuous Permafrost. The accelerated climate changes caused by Global Warming will potentially affect the subsurface depth of this permafrost. An increase in surface temperatures will result in a loss of permafrost. Release of frozen moisture will cause the land to sink and surface water to drain. The elevation of the land in Nunam Iqua lies between 1.5-4 meters

above sea level. Lower elevation would increase the flood potential. By installing thermosyphons to keep the ground chilled, some of the foundations in Nunam Iqua require permafrost for stability. All existing foundations will experience disruption with the loss of permafrost, including the water sewer utilidors with a helical pier support system foundation.

Previous Occurrences: Loss of permafrost is ongoing. Elders report that during the 1940s the river bank around Nunam Iqua was too high to land boats, except at the north end of Swan Lake. The tundra where log houses were located has sunk and become marsh land. Grass now grows where once there were willows. Ponds were shallower in 2006 and 2007, despite adequate rain. The Waterplant Washeteria concrete slab built on the gravel pad foundation has cracked due to changes underground. Even buildings on pilings have cracks in the walls due to the instability of permafrost.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists Wade Hampton Census Area as not having a Landslide hazard Present in the jurisdiction. Since the description of Landslide includes ground failure, the NIAPB ranked the probability as Highly Likely. The severity and magnitude of isolated instances of permafrost were determined to be Negligible. Changes in the permafrost are slow and cumulative. The hazard does not present an instantaneous danger to life and property.

Anticipated Loss

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Landslides	100%	100%	100%	\$76,589,647	\$114,795,359

See Section 9.0 Vulnerability Analysis for details

Mitigation Strategies for Landslides (Permafrost)

Goal: Protect existing facilities buildings, utilities, boardwalks, and gravel roads

- Document existing foundations and certify elevations for baseline on change

Goal: Develop recommendations for future construction

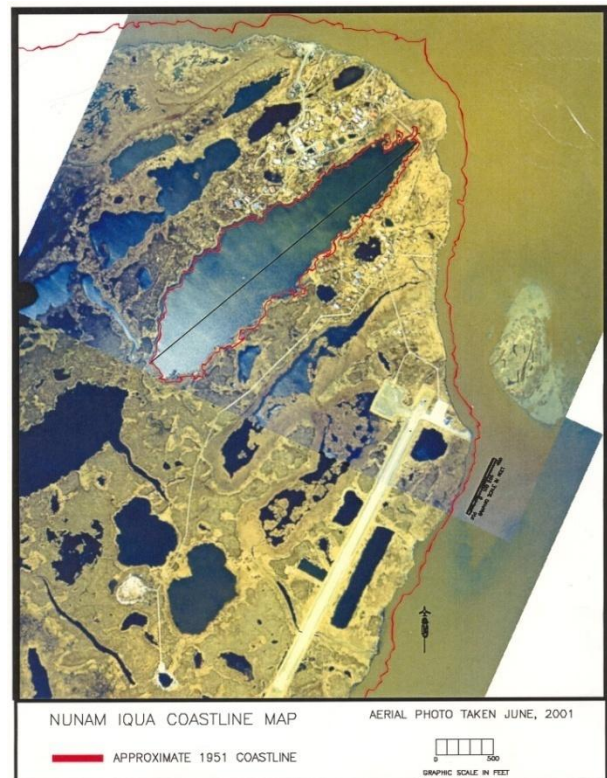
- Secure funding to do a feasibility study on future community foundations
- Plan and build more boardwalks
- Establish ATV trails on tundra and wetland for subsistence activities

6.4.3 Erosion

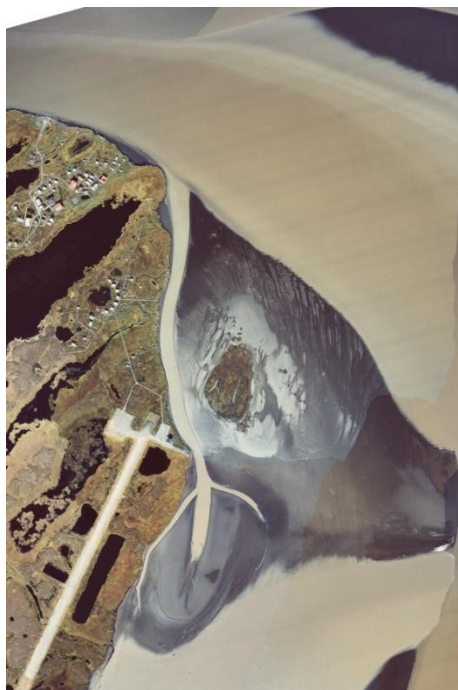
Hazard Description: Erosion is the process that involves the wearing away, transportation, and movement of land. Erosion is subdivided into Coastal Erosion, Riverine Erosion, Wind Erosion (see Appendix A-9)

Due to its location, on Kwemeluk Pass six miles from the Bering Sea, Nunam Iqua is subject to Coastal Erosion and Riverine Erosion. Nunam Iqua has no seawall or other shoreline protection structures. The multi-year impact of waves, tidal current, coastal storms, storm surges, and flooding causes severe Coastal Erosion. The fall time storm season has the greatest impact. In winter, bottomfast ice inhibits the vulnerability. Climate change due to Global Warming will potentially increase the threat of erosion due to the associated rising sea levels and loss of permafrost.

Riverine Erosion is the wearing away of river beds and deposition of material. Rivers constantly alter their course, changing shape and depth, balancing the sediment transport capacity



of the water and the sediment supply. For Nunam Iqua, located in the lower drainage of the Yukon River on Kwemeluk Pass, the constant erosion and deposition of material affects channel navigation and accessibility.



Maintaining a navigable waterway is essential to the community as the annual supply of fuel and other bulk supplies are shipped by barge. Summer commercial and subsistence fishing, as well as intra-village transportation are dependent upon the use of privately owned boats. The Nunam Iqua Airport originally received barge loads of gravel at river bank by the runway turnaround. Increased sediment buildup no longer allows access. To improve and extend the runway, the Department of Transportation's Airport Upgrade Project will require extending the existing gravel road so materials can be trucked overland from the barge landing pad located on the north side of the village.

Previous Occurrences: Erosion is ongoing.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having Erosion hazard present in the jurisdiction but the probability is unknown. The NIAPB ranked the probability for Erosion as Highly Likely. The severity and magnitude of isolated instances was determined to be Negligible. Changes by erosion are slow and cumulative. The hazard (in and of itself) does not present an instantaneous danger to life and property.

Anticipated Loss

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Erosion	*18% displaced	24%	30%	\$28,237,354	\$30,682,702

*Accelerated Long term Erosion could ultimately affect the entire community

Mitigation Strategies for Erosion (Riverine/Coastal)

Goal: Protect existing facilities buildings, utilities, boardwalks, and gravel roads

- Support relocation of buildings or facilities in danger from erosion
- Work with agencies, and organizations to identify new and emerging riverbank protection methods in order to develop a viable design to prevent further erosion
- Secure funding based on the design for construction of a seawall or similar shoreline protective measure

Goal: Develop recommendations for future construction.

- Collect all historical information on river bank erosion in Nunam Iqua to document and predict vulnerable areas.
- Establish land use policies that prevent construction in erosion prone areas

6.4.4 Technological

Technological hazards are those that are not natural in origin (See Appendix A-10). Examples include Hazardous Material accidents, Security threats (including terrorism), Infrastructure failures, Oil spills and Urban Fires.

Nunam Iqua is susceptible to Technological disasters. As noted under **6.4.5 Wildfire**, Nunam Iqua has a limited ability to respond to structural fires in the community that potentially could threaten lives as well as critical facilities. Nunam Iqua does not currently have a policy for handling Hazardous Materials in a community. Old batteries used in boats and at the power plant are not stored properly and there is no program to ship them out of the village. Construction chemicals end up in the dumpsite and waste oil from the power plant is burned there. With a bulk fuel storage capacity of over 133,000 gallons and 68 separate buildings heated by stove oil, the potential exists for an oil spill. An infrastructure failure, such as a power outage at the City owned Nunam Iqua Electric Company would shut down critical facilities, as well as the monitor stoves commonly used for home heating. Many of the newer houses have no wood stove for back-up. VHF's and telephones used during emergencies would not function. The safety of residents with chronic illnesses who rely on life support systems would be in put jeopardy. Once water and sewer pipes are in place, a sustained power outage would result in frozen pipes. In warmer months, lack of electricity can cause the loss of subsistence food stored in freezers. Electrical dependency has become a byproduct of progress in Nunam Iqua. The complete loss of electrical power for an extended period of time could cause a community wide disaster.

Previous Occurrences: The ADEC contaminated site data base lists three sites of oil spills that occurred in 1990, 1993, and 1995. In 1997, a malfunctioning automatic shut off resulted in the loss of the Washeteria by fire. The Alaska Energy Authority was contacted for assistance with a power outage due to a blown transformer in the winter of 2007. Although power was restored before structural damage of community facilities occurred, the potential for a community wide disaster became apparent when heavy equipment accidentally broke a power pole in March 2008, resulting in an extended community wide blackout.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having Technological hazard present in the jurisdiction but the probability is unknown. . Since the description of Technological includes hazardous spills and power outages, the NIAPB ranked a Technological hazard as Possible. The severity and magnitude were determined to be Critical.

Anticipated Loss

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Technological	100%	100%	100%	\$8,136,000	\$8,214,000

See Section 9.0 Vulnerability Analysis for details

A hazardous waste spill or power outage are a greater threat to the health and safety of residents than to the structures.

Mitigation Strategies for Technological (Power outage/Hazardous Spill)

Goal: Protect existing facilities buildings, utilities, boardwalks, and gravel roads

- Ensure proper maintenance requirements are met
- Design and construct back-up power source for critical facilities utilizing the old school generator

Goal: Improve Emergency Response

- Designate members of a utility response team in case of power outage and/or absence of power plant operators.
- Designate members of a spill response team in case of a hazardous spill and/or absence of bulk fuel tank operators.
- HAZ-mat training for all utility employees

6.4.5 Wildland Fire

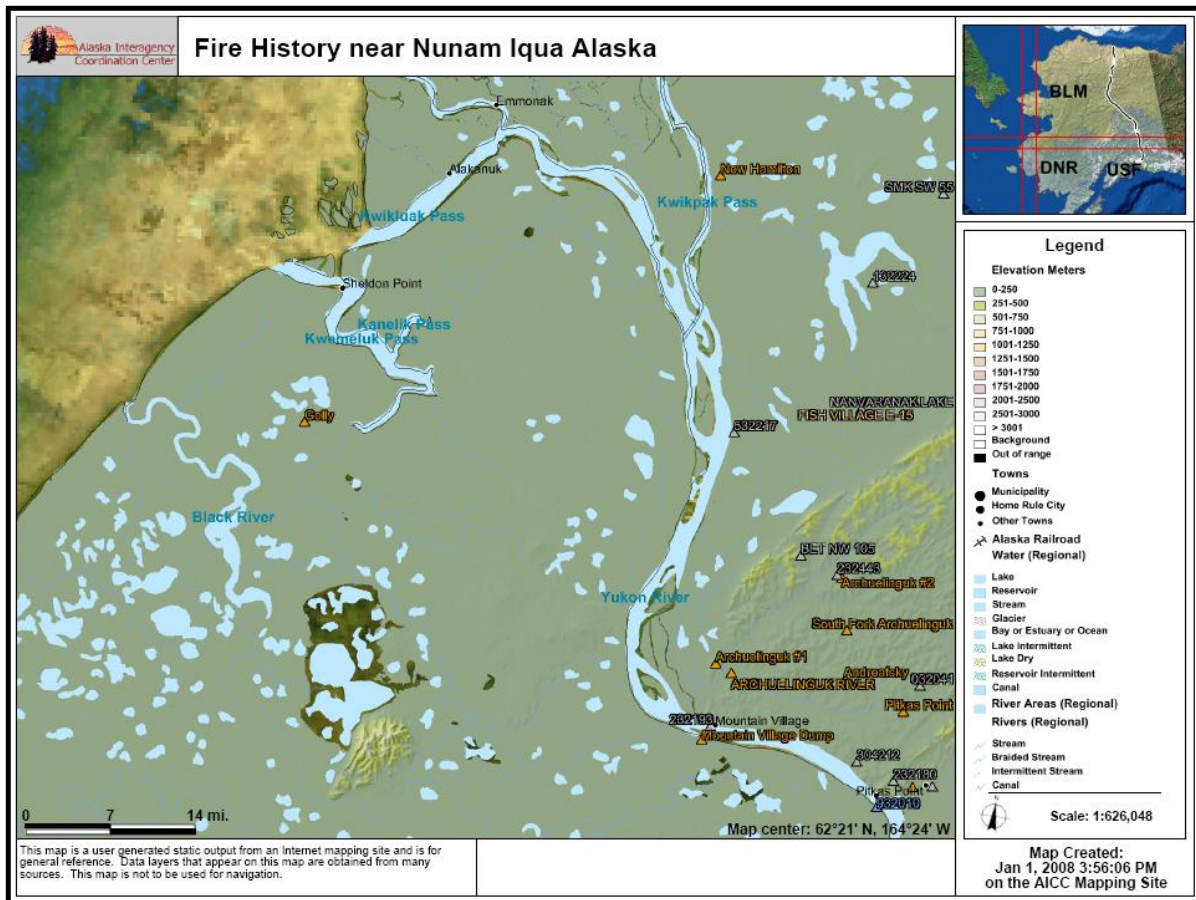
Fire is subdivided into a number of categories including Structure Fires, Prescribed Fires, Wildland Fires, Wildland Fire Use, Wildland-Urban Interface Fires (See Appendix A-2). An uncontrolled fire in an isolated community can be devastating. Fires that burn where structures and other human development meet with undeveloped wildland has the potential for extremely dangerous and complex fire burning conditions which pose a threat to public and firefighter safety.

Nunam Iqua is located in the Yukon Delta National Wildlife Refuge, where management of Wildland fires is the responsibility of the State Division of Forestry. Surrounded by tundra and wetlands, Nunam Iqua lies in a low probability area at risk for Wildland fires, however an exceptionally dry season compounded by high winds could result in a catastrophic wildfire that would threaten the entire community. Besides potential loss of life and injury, the costly structural fires could include critical and essential facilities.

Nunam Iqua depends upon the Nunam Iqua Traditional Council volunteer fire department. Code Red equipment is located within the community. Water and sewer is under construction and fire hydrants are anticipated to be available with completion of the community wide water sewer project in 2009-2010.

Grass around houses increases the danger from wildland fires. Burning instead of cutting, to mitigate the hazard, can have disastrous results for the homeowner and the community should the fire get out of control.

Each year between 600 and 800 wildland fires, mostly between March and October, burn across the State of Alaska causing extensive damage. Smoke from local as well as regional fires can be carried by winds with potential health risks for residents of Nunam Iqua. Visibility can be reduced significantly and disorient people traveling in the Lower Yukon area.



Previous Occurrences:

Although there have been no Wildland Urban interface fires, the above map shows the location of Wildland Fires within 50 miles of Nunam Iqua, (formerly known as Sheldon Point).

Hazard Vulnerability The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having a Wildland Fire hazard in the jurisdiction, but the probability is unknown. . Since the description of Wildland Fire includes Wildland Urban interface, the NIAPB ranked the probability as Possible. Should it happen the severity and magnitude were considered to be Critical.

Anticipated Loss

Hazard	Population	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Wild Fire	100%	81%	100%	\$ 51,073,406	\$89,279,118

See Section 9.0 Vulnerability Analysis for details

Mitigation Strategies for Wildland Fire (Wildland Urban Interface fires):

Goal: Improve Emergency Response

- Develop Emergency Response Plan
- Increase recruitment, incentives, and training for emergency response personnel including CPR training, Code Red training and Firefighting training)
- Acquire additional response equipment such as breathing apparatus

Goal: Develop recommendations for future construction.

- Promote Fire Wise building design, site locations, and materials for construction
- Educate Public on landscaping techniques

6.4.6 Economic

An economic disaster declaration does not trigger the availability of disaster assistance in the manner of a natural or technological disaster (See Appendix A-11). Economic disasters can result from natural disasters. Poor business practices and public policies that inhibit competition can also result in economic disasters.

Economic development agencies have programs designed to help build, broaden and diversify the economic base. One goal is to create an environment in which economic development can flourish. Economic development includes quality of life issues, such as a low crime rate.

Nunam Iqua is 20 miles from the nearest State Troopers facility in Emmonak. Crime control is not adequate and robberies go unpunished. Lack of police protection has the potential to stifled and stop economic development. In Nunam Iqua, a privately owned store closed due to robbery. The Tribal government no longer has a store due to repeated robberies. With the cost of fuel increasing, a lack of economic development will have a disastrous effect. No job or income means bills go unpaid. Operation of critical facilities may not be affordable. A high crime rate is an economic hazard. The quality of village life must be improved by a lower crime rate for diversified economic development to begin.

Previous Occurrences: A cash economy was well established by 1940, with commercial salmon fishing. The collapse of commercial salmon fishing in the Lower Yukon in 2000 was declared an economic disaster. In 2007, there were seven break-ins in where money was stolen from the City, Tribal, and Corporation enterprises. The Community Hall was set on fire after one of the robberies resulting in over \$100,000 damage.

Hazard Vulnerability The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as being unknown if Economic hazard present in the jurisdiction. The NIAPB ranked the probability of an Economic Disaster as Possible. Should it happen the severity and magnitude were considered to be Critical.

Anticipated Loss

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Economic	100%	100%	100%	\$76,589,647	\$114,795,359

See Section 9.0 Vulnerability Analysis for details

Mitigation Strategies for Economic (Crime Rate)

The following goals were established to encourage economic development by increasing the quality of life factors by decreasing the crime rate.

Goal: Protect existing facilities, buildings, utilities, boardwalks, and gravel roads

- Support the local police force by providing infrastructure to make public safety possible. Needed infrastructure includes a Public Safety Building and housing for the Police Officer.

6.5 Non Priority Hazard Profiles

6.5.1 Biological

Biological hazards include epidemics that can spread throughout the community.

Nunam Iqua is an isolated community with a limited workforce. Critical facilities require operation and maintenance. If operators become ill and unable to perform their jobs, these facilities could potentially shut down. During an epidemic, Health Aides in the Clinic need running water and electricity to provide for the health of community residents. Airport access is needed for medical personnel, supplies, and patients. Communication systems are needed to distribute information to help control the epidemic.

Nunam Iqua is located in the Yukon Delta Wildlife Refuge and surrounded by waterfowl. In 2006, many birds were tested to confirm that they did not carry the Bird Flu. If the anticipated epidemic had occurred, the effect on Nunam Iqua could be potentially devastating. In recent years, local observation of diseased fish and marine animals has increased. Handling and ingestion of diseased birds or animals, during traditional subsistence activities, could potentially be a hazard to the health of residents.

Previous Occurrences: Epidemics are reported to have occurred in the Yukon Delta in 1838-39 (small pox), 1852-53 (influenza), 1861 (influenza), 1900 (measles influenza), and 1919 (Spanish influenza). In the 1940s tuberculosis was epidemic in the Yukon Delta. Alaska moved as many as 4,000 natives to sanatoriums during this period. In 2005, the possibility of Bird Flu transferring to humans put the Yukon Delta on alert for a potential epidemic.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix does not list Biological as a hazard. The NIAPB ranked the probability as Unlikely, however should a biological hazard the magnitude and severity were determined to be Critical.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

6.5.2 Flooding

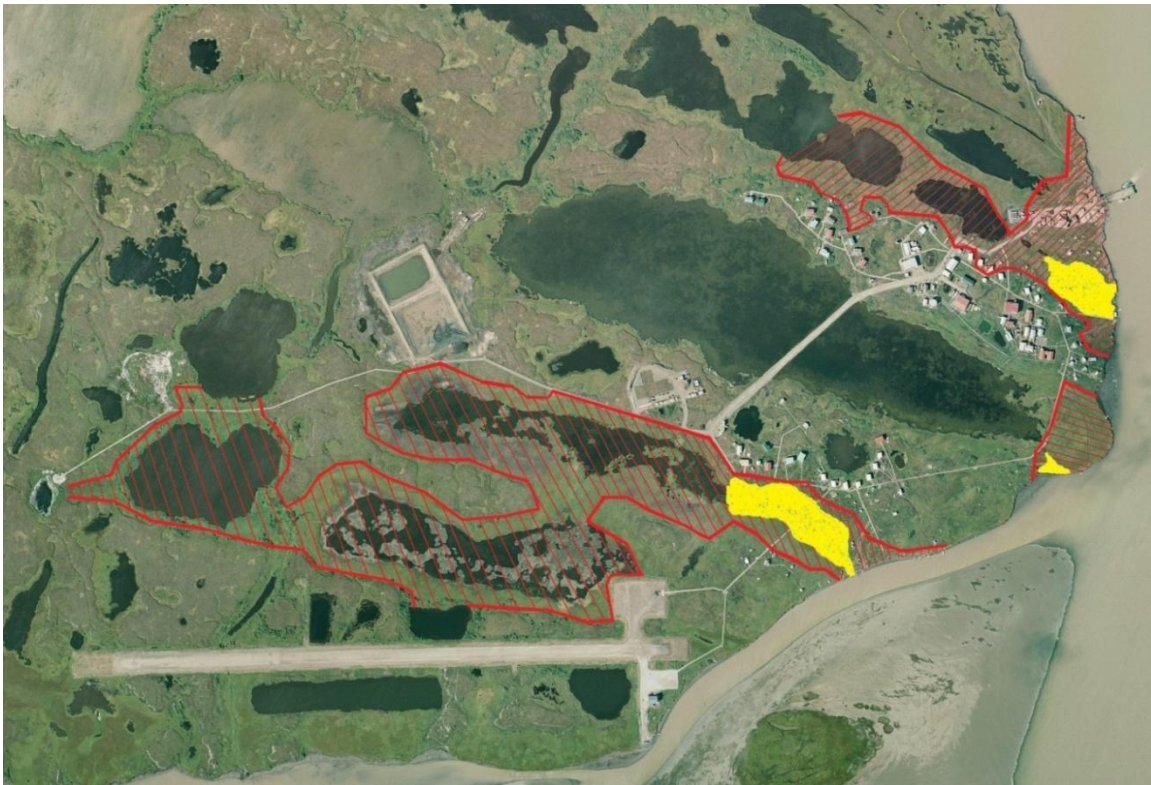
Flooding threatens life, safety and health and can cause property loss (see Appendix A-1).

Nunam Iqua is subject to flooding due to its location on Kwemeluk Pass, the southern mouth of the Yukon River; approximately six miles from the Bering Sea coast.

Flooding is subdivided into a number of categories including rainfall-runoff floods, snowmelt floods, ground-water flooding, ice jam floods, flash floods, fluctuating lake levels, alluvial fan floods and glacial outburst floods. Of these flood categories, Nunam Iqua is primarily threatened by ice jam floods. Coastal Flooding due to a Storm Surge is discussed in **6.4.1 Severe Weather**.

Ice jam flooding in the Lower Yukon occurs primarily during spring break-up. The depth of the snowpack and break-up weather patterns upriver influence the volume of water entering the Yukon River drainage. When an ice jam occurs, water collects upstream from the jam, flooding an area by creating a lake-like effect, analogous to a dam. Once the jam is breached there is usually a rapid draining of the water from behind the jam. Not only does the downstream water level rise significantly once the jam is breached, but there is substantial current, which can cause erosion and extensive damage. Additionally, the rising water causes the ice to float and the increased velocities move the ice further downstream. The motion of large solid blocks of ice is often very destructive.

Alakanuk and Emmonak, the communities directly upriver from Nunam Iqua, have experienced several disasters in recent years due to ice jam flooding. For Nunam Iqua the danger is not as great, though the potential exists in the spring with the presence of an increased volume of water flowing down the Yukon and winds bringing higher than normal tides. Water first enters the village through the low land areas. Boats and nets stored on the river bank can be damaged by ice at that time. An atypically severe spring flood could cause damage to facilities. Mitigation measures would be similar to those addressed under storm surge (Section 6.4 Severe Weather). See the Nunam Iqua Spring Flooding Map for the typical spring flooding potential.

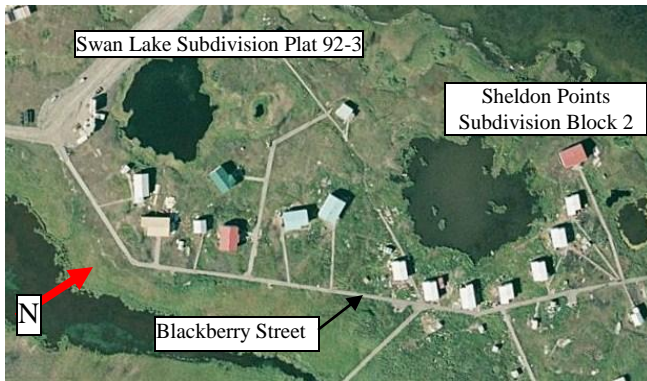


Nunam Iqua Typical Spring Flooding Map

Key: **Primary Spring Flooding** -----Secondary Spring Flooding

Previous Occurrences: Elders do not recall significant danger from break-up flooding. Nunam Iqua reported no damage when State Disasters were declared for the Lower Yukon in 2005 and 2006. In the spring of 2008, an atypical spring flood occurred due to the combination of a broken ice jam on the Yukon River, a south wind, and the high tides that occur after a full moon. This flooding mirrored the preliminary stages of a storm surge.

Spring 2008 Residential Flooding



Blackberry Street
(Sheldons Point Subdivision Block 2)



Blackberry Street (south of Swan Lake
Subdivision Plat 92-3)

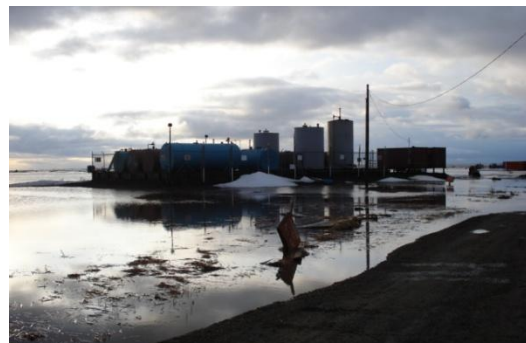


Blackberry Street
(Sheldons Point Subdivision Block 2)

Infrastructure Flooding



Flooding around the City Office
and in front of the Community Hall



Flooding around the Bulk Fuel Tank Farm

The 2008 Spring Flood was atypically severe with damage primarily to the boardwalk system. Higher water levels due to global warming could increase the risk of future spring flooding. The potential threat of water and ice to community facilities is the same as during a Storm Surge (**Hazard #1, see Section 6.3**). The NIAPB concluded that implementation of the Storm Surge mitigation measures will also help minimize damage due to spring flooding.

Hazard Vulnerability The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having Flooding hazard present in the jurisdiction but the probability is unknown. The NIAPB ranked the probability as Possible, and should a spring ice jam flood occur, the magnitude and severity were determined to be Negligible. The NIAPB agreed that any repetition of the 2008 spring flooding would result in a revised ranking.

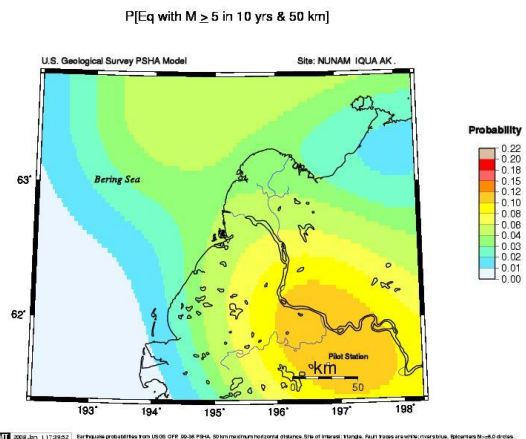
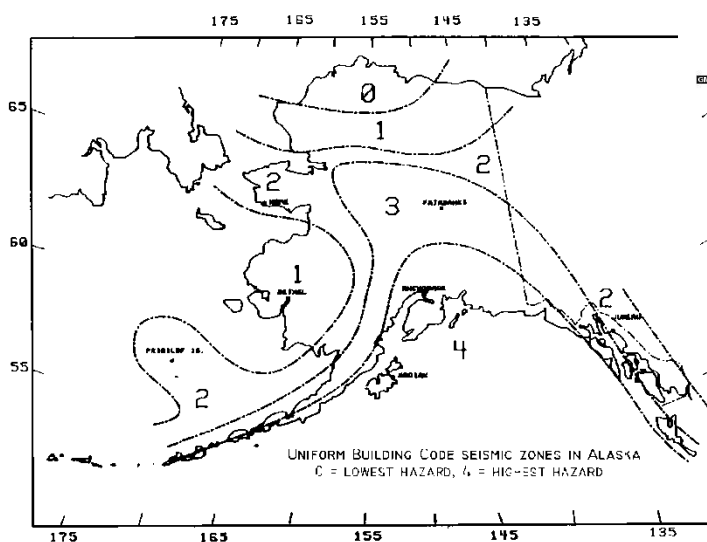
Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards, however an atypical spring flood and a storm surge would cause similar damage.

Mitigation Strategies: Mitigation Strategies under Severe Weather address potential flooding and ivu. These strategies are applicable to atypical spring ice jam flooding.

6.5.3 Earthquake

Alaska is one of the most seismically active regions of the world (See Appendix A-3). The likelihood that the earthquake would be centered near Nunam Iqua is very low. Using the USGS Earthquake Probability Mapping Model, there is a 4% probability of a greater than 5.0 magnitude earthquake occurring over the next 10 years in the vicinity of Nunam Iqua.

The probability of there being a greater than 5.0 magnitude earthquake occurring in the vicinity of Nunam Iqua over the next fifty years is less than 25% and in the next 100 years less than 50%.



The Environmental Atlas of Alaska places Nunam Iqua in Seismic Zone 1.

Earthquakes measuring 3.0 to 4.5 on the Richter scale are possible in this zone and could cause structure damage.

Previous Occurrences: Elders say that during the earthquake in 1964, the tundra to ripple and an audible noise traveled with the shock wave. There are no reports of earthquakes causing actual damage in Nunam Iqua.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having an Earthquake hazard present in the jurisdiction but the probability is unknown. The NIAPB ranked the probability of an earthquake as Possible,

however due to no historical reports of earthquakes, the magnitude and severity were determined to be Negligible.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

6.5.4 Volcano

Volcanic eruptions create Lava Flows, Pyroclastic Flows, Pyroclastic Surges, Lava Domes, and Volcanic Ash and Bombs, Volcanic Gases, Debris Avalanches, Debris Flows (See Appendix A-4). Although there are reported volcanic remnants in elevations near Nunam Iqua, there are no historically active volcanoes within lava range. Other by-products of active volcanoes, such as Volcanic Ash, can be carried to Nunam Iqua by the wind and potentially decrease visibility. If the fine ash is inhaled it can become a health hazard. Operation of mechanical equipment, such as aircraft, can be effected. Deposits on an existing snow cover and ice can result in accelerated melting during spring break-up, making travel hazardous.

Previous Occurrences: There is no history of damage in Nunam Iqua caused by a volcanic hazard.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as having the Volcano hazard present in the jurisdiction but the probability is unknown. The NIAPB ranked the probability as Unlikely, however should a volcanic hazard occur, the magnitude and severity were determined to be Negligible.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

6.5.5 Drought

Drought is a long period of low rainfall; a prolonged scarcity or shortage. Nunam Iqua is located in a wetland with numerous fresh water lakes and sloughs, and does not usually experience drought conditions. The community's primary water source is Yukon River, where water pumped and processed by the Flocculation/ Sedimentation Filtration method before dispensing. A secondary water source during winter months is ice. During the summer, should there be an extended period of low rainfall the greatest danger is a wildland fire that could spread rapidly.

Previous Occurrences: There is no history of damage in Nunam Iqua due to a drought.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as being unknown if Drought hazard is present in the jurisdiction. The NIAPB ranked the probability of drought Unlikely, however should a drought hazard occur, the magnitude and severity were determined to be Negligible.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

6.5.6 Snow Avalanche

Snow Avalanche conditions are influenced by slope angle, slope aspect, and terrain roughness (See Appendix A-5). Nunam Iqua is part of a broad flood plain with elevations ranging from 1.5 meters to 4 meters. Snow Avalanche is not identified as a hazard for Nunam Iqua.

Previous Occurrences: There is no history of damage in Nunam Iqua due to a snow avalanche.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as not having snow avalanche hazard present in the jurisdiction. The vulnerability was determined to not be significant enough to rank by the NIAPB.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

6.5.7 Tsunami & Seiche

The Alaska coastline facing the Bering Sea has a very low tsunami threat due to the coastal shelf (See Appendix A-6). Nunam Iqua is located six miles from the Bering Sea coast. Tsunami & Seiche are not identified as hazards that affect Nunam Iqua

Previous Occurrences: This story was told by an elder who lived further up the coast: Some sixty years ago, a tide was sucked out to sea and returned in a massive wave. The possibility that this was a tsunami would indicate that the hazard cannot be completely excluded.

Hazard Vulnerability: The State of Alaska Hazard Mitigation Plan Hazard Matrix lists the Wade Hampton Census Area as not having Tsunami & Seiche hazard present in the jurisdiction. The vulnerability was determined to not be significant enough to rank by the NIAPB.

Anticipated Loss: Estimates were not made on anticipated loss for non-priority hazards.

Mitigation Strategies: Mitigation Strategies were not addressed for non-priority hazards.

7.0 CAPABILITY ASSESSMENT

7.1 Local Technical and Legal Resources

Within Nunam Iqua, the resources are limited. Regulatory Tools, which include ordinances, and codes that support mitigation efforts are minimal. The Nunam Iqua Advisory Planning Board began comprehensive planning in 2005. Planning revealed that there is community support for a subdivision ordinance and building codes.

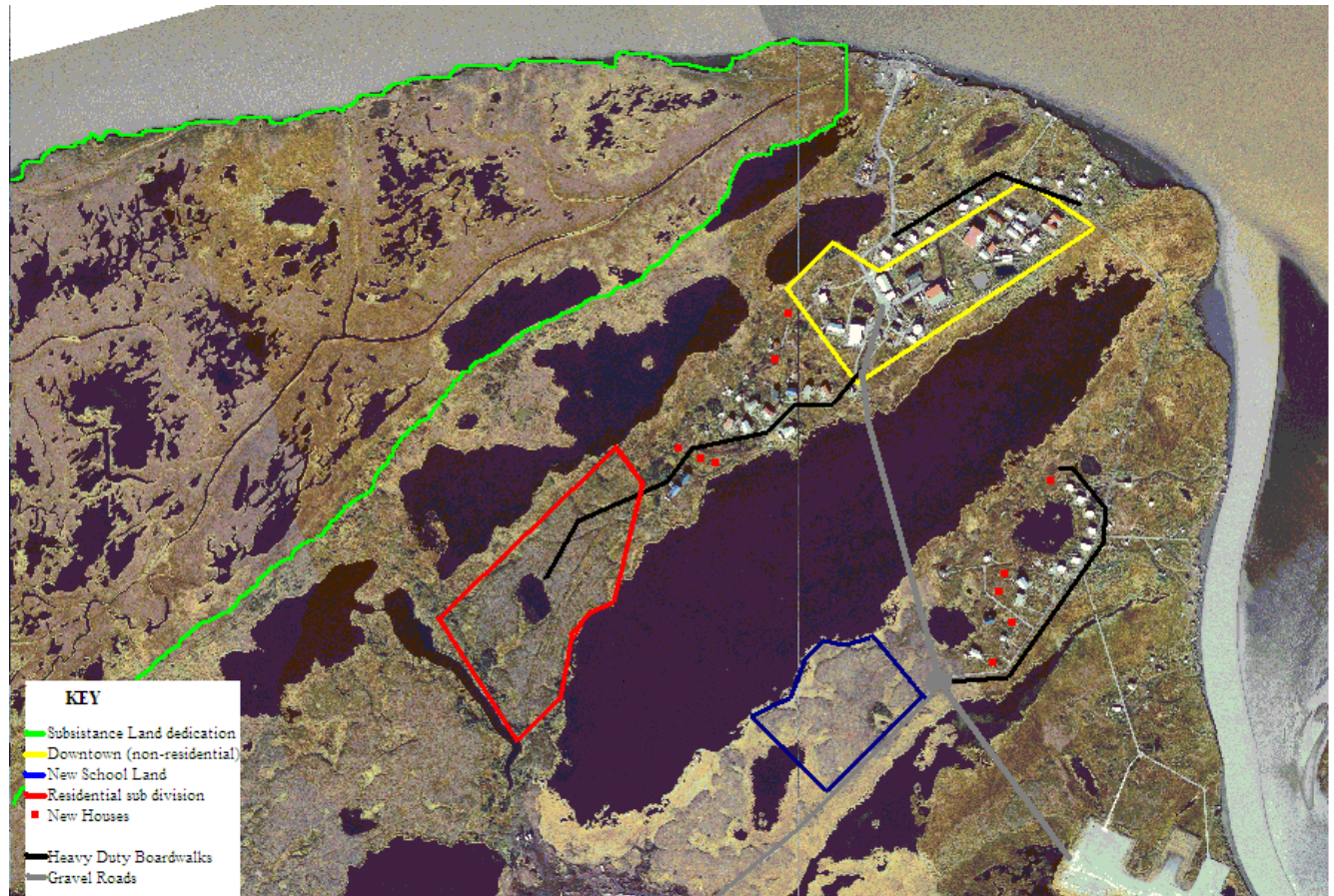
Regulatory Tools Ordinances, codes, plans	Authority	Comments (year of most recent update.
Building Code	N	Currently per State Statute
Zoning Ordinance	N	Currently no ordinances exist
Subdivision Ordinance	N	Currently no ordinances exist
Special Purpose Ordinance	N	Currently no ordinances exist
Growth Management Ordinance	N	Currently no ordinances exist
Comprehensive Plan	Y	Nunam Iqua Strategic Plan for Comprehensive Development 2005
Capital Improvement Plan	Y	Nunam Iqua 2006 Water Sewer Improvement Plan Update and Nunam Iqua Strategic Plan for Comprehensive Development 2005
Economic Development Plan	Y	Nunam Iqua Strategic Plan for Comprehensive Development 2005, Nunam Iqua Water/Sewer Business Plan 2007
Transportation Plan	Y	Nunam Iqua Transportation Improvement Plan 2007
Emergency Response Plan	N	
Post Disaster Recovery Plan	N	
Post Disaster Recovery Ordinance	N	Currently no ordinances exist
Real Estate Disclosure Requirements	N	Currently per State Statute

7.2 Local Administrative Capabilities

Staff Resources	Entity	Individual	Phone #
City Administrator	City of Nunam Iqua	Esther Manumik	498-4226
City Clerk	City of Nunam Iqua	Johanna Murphy	498-4226
Utility Manager	Nunam Iqua Electric Company	Esther Manumik	498-4226
NIAPB Administrator	NIAPB	Carin Finch	498-4226
Volunteer Fire Chief	Native Village of Sheldon Point	Segundo Strongheart	498-4427
Land Planner	Swan Lake Corporation	James O'Malley	498-4135
Grant Writer	City of Nunam Iqua	Carin Finch	498-4226
Tribal Administrator	Native Village of Sheldon Point	Rose Raphael	498-4911

7.3 Future Development Trends

Although there is no zoning ordinance, the community approved comprehensive plan includes a dedication of land to infrastructure development, residential growth, and subsistence activity within the City limits.



Future development trends will be consistent with this overall development plan. The Future Housing area (red) was selected on high ground to mitigate the flooding hazard. The location also minimizes potential erosion problems. The Subsistence area (green) is low land highly susceptible to flooding and erosion. Dedicating this land to subsistence activities will preclude construction of structures. Incorporating the mitigation plan into the comprehensive development plan will ensure that all potential hazards are considered during site selection for future capital projects.

7.3 Federal, State, and Other Resources:

Federal Resources: The federal government requires local governments to have a hazard mitigation plan in place to be eligible for funding opportunities through FEMA such as the Pre-Disaster Mitigation Assistance Program and the Hazard Mitigation Grant Program. The

Mitigation Technical Assistance Programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described below:

How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides mirror the four major phases of hazard mitigation planning used in the development of the Nunam Iqua Hazard Mitigation Plan. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting Disaster Mitigation Act (DMA) 2000 requirements (<http://www.fema.gov/fima/planhowto.shtm>).

- **Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments.** FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.
- **Mitigation Resources for Success CD.** FEMA 372, September 2001. This CD contains a wealth of information about mitigation and is useful for state and local government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.
- **A Guide to Federal Aid in Disasters.** FEMA 262, April 1995. When disasters exceed the capabilities of state and local governments, the President's disaster assistance program (administered by FEMA) is the primary source of federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.
- **The Emergency Management Guide for Business and Industry.** FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to Nunam Iqua businesses.

Other Federal Resources:

- **Department of Agriculture.** Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.
- **Department of Energy, Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program.** This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.
- **Department of Housing and Urban Development, Office of Homes and Communities, Section 108 Loan Guarantee Programs.** This program provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.
- **Department of Housing and Urban Development, Community Development Block Grants.** Administered by DCCED, Division of Community Advocacy. Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.
- **Department of Labor, Employment and Training Administration, Disaster Unemployment Assistance.** Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.
- **Federal Financial Institutions.** Member banks of FDIC, FRS or FHLBB may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
- **Internal Revenue Service, Tax Relief.** Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to three years.
- **United States Small Business Administration.** May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to the Alaska Division of Homeland Security and Emergency Management.

Other resources: The following are Web sites that provide focused access to valuable planning resources for communities interested in sustainable development activities.

- **Federal Emergency Management Agency,** <http://www.fema.gov> – includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.
- **American Planning Association,** <http://www.planning.org> – a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- **Institute for Business and Home Safety,** <http://ibhs.org> – an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering

caused by natural disasters. Online resources provide information on natural hazards, community land use, and ways citizens can protect their property from damage.

State Resources:

ADHS&EM is responsible for coordinating all aspects of emergency management for the State of Alaska. Public education is one of its identified main categories for mitigation efforts. Improving hazard mitigation technical assistance for local governments is another high priority list item for the State of Alaska. Providing hazard mitigation training, current hazard information, and the facilitation of communication with other agencies would encourage local hazard mitigation efforts. DHS&EM provides resources for mitigation planning on their Web site at <http://www.ak-prepared.com>.

- **DCCED, Division of Community Advocacy:** Provides training and technical assistance on all aspects of the National Flood Insurance Program and flood mitigation.
- **Division of Senior Services:** Provides special outreach services for seniors, including food, shelter and clothing.
- **Division of Insurance:** Provides assistance in obtaining copies of policies and provides information regarding filing claims.
- **Department of Military and Veteran's Affairs:** Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits.

Other Funding Sources and Resources

- **Real Estate Business.** Real estate disclosure is required by state law for properties within flood plains.
- **American Red Cross.** Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
- **Crisis Counseling Program.** Provides grants to State and Borough mental health departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.

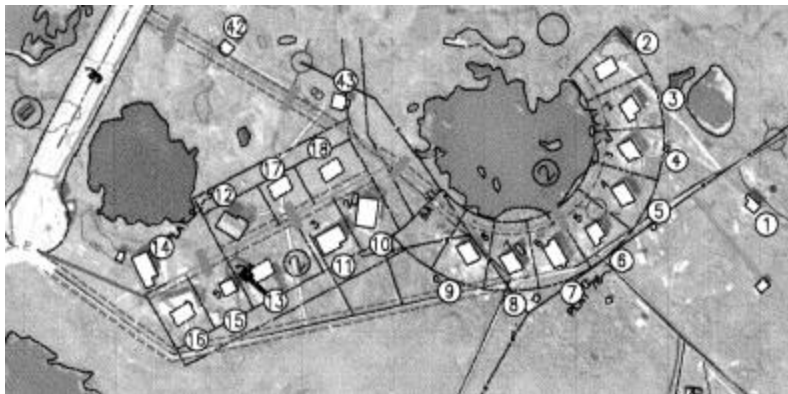
8.0 INVENTORY ASSESSMENT

8.1 Housing: All of the housing was inventoried and the current number of occupants and bedrooms noted. On the following north and south side figures, existing residential houses include houses 1-43, except for 17 and 18 (which have not been built). Three houses have no number but are identified by owner: John Camille's (occupied), Maggie Strongheart's (unoccupied) and Joseph Afcan's (abandoned). There are 4 School housing (G), and one Itinerant Apartment, for a total of 48 houses, one apartment. See the Housing Inventory on the following page.

House numbers on the North side



House numbers on the South side houses



Housing Inventory 2007

Map #	Residential Housing	Class	#Bedrm	#People	Longitude		Latitude		Foundation
14	June Camille	N	2	4	N62	31.608	W164	50.888	Pad & post
16	Josephine Charlie	N	3	1	N62		W164		Pad & post
15	Aloysius Adonis	N	1	2	N62	31.62	W164	50.818	Pad & post
13	Daryl Manumik	N	3	5	N62	31.632	W164	50.835	Piling
11	Vanessa Hunter	N	3	1	N62	31.643	W164	50.825	Piling
10	Mary Stuart	N	4	2	N62	31.659	W164	50.816	Piling
12	Agatha Paukan	N	3	4	N62	31.639	W164	50.877	Piling
42	Johanna Murphy	N	1	2	N62	31.667	W164	50.945	Pad & post
43	Segundo Strongheart	N	1	3	N62	31.678	W164	50.873	Pad & post
9	Eugene Pete	N	3	3	N62	31.671	W164	50.759	Piling
8	Justin Ignatius	N	3	4	N62	31.676	W164	50.734	Piling
7	Margaret Shelton	N	4	5	N62	31.685	W164	50.72	Piling
6	Donna O'Malley	N	2	10	N62	31.693	W164	50.711	Piling
5	Joseph P Strongheart	N	3	4	N62	31.708	W164	50.714	Piling
4	Alphonsus Pete	N	3	6	N62	31.719	W164	50.727	Piling
3	Edith Johnson	N	2	11	N62	31.724	W164	50.74	Piling
2	Francine Afcan	N	3	4	N62	31.734	W164	50.764	Piling
1	Rosalie Raphael	N	1	3	N62	31.729	W164	50.672	Pad & post
X	John Camille's house	N	0	3	N62	31.875	W164	51.044	Pad & post

Nunam Iqua Hazard Mitigation Plan 2008

Map #	Residential Housing	Class	#Bedrm	#People	Long.		Lat.		Foundation
X	Joseph Afcan's house	N	1	0	N62		W164		Pad & post
40	Frank Camille's House	N	1	1	N62	31.916	W164	50.826	Pad & post
41	John Canoe	N	1	3	N62	31.916	W164	50.826	Pad & post
38	Andrew Stern	N	2	1	N62	31.916	W164	50.826	Pad & post
19	James O'Malley	N	2	4	N62	31.903	W164	50.877	Piling
20	Mildred Camille	N	3	2	N62	31.927	W164	50.897	Piling
21	J. Shelton's House	N	2	1	N62	31.91	W164	50.952	Piling
22	Cyril Murphy	N	2	9	N62	31.901	W164	50.979	Piling
23	Roger Canoe, Sr.	N	3	4	N62	31.899	W164	50.998	Piling
37	James Adams	N	1	0	N62	31.894	W164	50.972	Pad & post
24	Julia Afcan	N	4	2	N62	31.892	W164	51.016	Piling
25	Gloria Manumik	N	1	6	N62	31.821	W164	51.041	Pad & post
X	Maggie J. Strongheart	N	1	0	N62	31.797	W164	51.082	Pad & post
26	Irene Camille	N	3	6	N62	31.794	W164	51.175	Piling
27	Patricia Ignatius	N	3	10	N62	31.795	W164	51.148	Piling
28	Andrea Charlie	N	3	1	N62	31.795	W164	51.174	Piling
29	Lucy M Camille	N	4	4	N62	31.794	W164	51.19	Piling
31	Paul Manumik Jr	N	3	7	N62	31.778	W164	51.208	Piling
30	Paul J. Manumik Sr	N	5	4	N62	31.769	W164	51.19	Piling
32	Edward Adams Sr	N	3	6	N62	31.786	W164	51.236	Piling
39	Elizabeth Adams	N	2	1	N62	31.796	W164	51.248	Pad & post
33	Esther Sugar	N	3	7	N62	31.77	W164	51.242	Piling
34	Joseph G. Strongheart	N	3	9	N62	31.771	W164	51.262	Piling
35	Stanley Pete	N	4	2	N62	31.742	W164	51.341	Piling
36	Martha Owletuck	N	3	3	N62	31.732	W164	51.357	Piling
G	Teacher Housing (243)	N	2	1	N62	31.911	W164	50.838	Piling
G	Teacher Housing (241)	N	2	1	N62	31.921	W164	50.820	Pad & post
G	Teacher Housing (240)	N	2	2	N62	31.916	W164	50.836	Pad & post
G	Teacher Housing (242)	N	2	2	N62	31.911	W164	50.829	Pad & post
G	Itinerant Apartment	N	1	0	N62	31.861	W164	51.023	Piling

As noted there is a total of 48 Houses and one apartment. Houses marked X are abandoned or seasonal, except for John Camille's house which is occupied. The figures locating the houses see the previous page.

8.2 Facilities: The current facilities in Nunam Iqua were inventoried and classified according to Critical, Essential, and Non-Critical. Critical Facilities were defined as facilities and infrastructure necessary for emergency response. Essential Facilities were defined as facilities and infrastructure that supplement response efforts. Non-Critical were defined as facilities and infrastructure that are not needed for response efforts.

Nunam Iqua is an isolated village. Alakanuk, the nearest community, is fourteen miles air miles away. During a natural disaster, outside resources may be unavailable. Nunam Iqua will only be able to utilize local resources. For this reason, Essential Facilities shall be counted as Critical. With facilities limited to the Critical and Non-critical categories, the Facility Inventory (on the following page) summary lists 36 facilities considered "Critical". Four facilities were considered "Non-Critical (2 churches, the waste haul utility, and the solid waste dumpsite). For photographs and detailed information of most of the Critical facilities see Appendix E.

Facilities Inventory

#	COMMUNITY FACILITY	Facility Type	Class	Latitude		Longitude	
1	Washeteria/Waterplant	Waterplant/Washeteria	C	N62	31.869	W164	50.962
2	Gravel Pad Water/Wash	Waterplant/Washeteria	C	N62	31.869	W164	50.962
3	Water Tank	Water Treatment Facility	C	N62	31.884	W164	50.986
4	Sewage Lagoon	Sewage Lagoon	E	N62	31.403	W164	51.363
5	Nunam Iqua Tribal Clinic	Clinic/ER	C	N62	31.876	W164	50.976
6	Code Blue	Clinic/ER	E	N62	31.870	W164	50.993
7	City Hotel	Hotel	E	N62	31.682	W164	51.014
8	Code Red	Fire Station	C	N62	31.886	W164	51.053
9	Police Dept.	Police Station	E	N62	31.841	W164	50.004
10	Power Plant	Power Generation Facility	C	N62	31.837	W164	51.004
11	Nunam Iqua Trading Post	Store	E	N62	31.838	W164	51.077
12	Corporation Building	Bering Pacific	E	N62	31.835	W164	51.085
13	Tank Farms	Fuel Storage Tanks	C	N62	31.958	W164	51.062
14	City Office	Offices	E	N62	31.865	W164	51.22
15	Tribal Community Building	Offices	E	N62	31.855	W164	51.050
16	Airport Building	Airport	C	N62	31.423	W164	50.540
17	UUI Building	Telephone	C	N62	31.827	W164	51.181
18	Barge Landing	Harbor/Dock/Port	E	N62	32.023	W164	50.989
19	Teen Center	Offices	E	N62	31.898	W164	51.808
20	NIFCO	Store	E	N62	31.963	W164	51.044
21	Power Lines	Power Generation Facility	C	N62	32	W164	52
22	Airport Runway	Airport	C	N62	31	W164	50
23	Graveyards	Cemetery	C	N62		W164	
24	Causeway	Road	C	N62		W164	
25	Airport Access Road	Road	C	N62		W164	
26	River Access Road	Road	C	N62		W164	
27	Lagoon Access Road	Road	E	N62		W164	
28	Boardwalks	Road	E	N62		W164	
29	School Shop	School	E	N62	31.911	W164	50.819
30	School Library	School	E	N62	31.896	W164	50.873
31	School Generator building	Power Generation Facility	C	N62	31.897	W164	50.874
32	Portable classroom	School	E	N62	31.918	W164	50.863
33	Main Office/Gym/ K-1	School	E	N62	31.904	W164	50.879
34	BIA Building	School	E	N62	31.911	W164	50.778
35	School Tanks	Fuel Storage Tanks	C	N62	31.896	W164	50.840
36	New School site	School	C	N62	31.565	W164	51.081
37	City Dump	Landfill	N	N62	31.158	W164	51.543
38	Honey Bucket Utility	Waste Haul Utility	N	N62	31.044	W164	51.400
39	Catholic Church	Church	N	N62	31.916	W164	50.826
40	Assembly of God Church	Church	N	N62	31.585	W164	50.658

As noted: Four facilities were considered “N” for Non-Critical (2 churches, the Waste haul utility, and the solid waste dumpsite) for a total of 36 facilities considered “C” for Critical and “E” for Essential.

9.0 VULNERABILITY ANALYSIS

9.1 Facilities Structural Value Chart

The Structural Value Chart lists 36 Facilities and their associated values. Four school facilities are not on the list as they will be abandon or demolished with completion of the new school in 2008-9. One facility is added at the bottom of the list. The water/sewer mains and service line is currently under construction. Graveyards are considered priceless and not given a value.

	COMMUNITY FACILITY	Class	Facility Type	Structural Value	Source
1	Washeteria/Waterplant	U	Waterplant/Washeteria	\$2,600,000	CE2 contractor
2	Gravel Pad Water/Wash	U	Waterplant/Washeteria	\$568,000	CE2 contractor
3	Water Tank	U	Water Treatment Facility	\$636,000	CE2 contractor
4	Sewage Lagoon	U	Sewage Lagoon	\$1,819,189	CE2 contractor
5	Nunam Iqua Tribal Clinic	HS	Clinic/ER	\$907,509	YKHC
6	Code Blue	HS	Clinic/ER	\$15,000	Estimate
7	City Hotel	C	Hotel	\$205,000	CE2 contractor
8	Code Red	HS	Fire Station	\$35,000	YKHC
9	Police Dept.	HS	Police Station	\$200,000	Ind. Lumber contractor
10	Power Plant	U	Power Generation Facility	\$2,000,000	AEA
11	Nunam Iqua Trading Post	C	Store	\$1,000,000	Estimate (unavailable)
12	Corporation Building	C	Bering Pacific	\$500,000	Ind. Lumber contractor
13	Tank Farms	U	Fuel Storage Tanks	\$2,000,000	AEA
14	City Office	G	Offices	\$200,000	Ind. Lumber contractor
15	Tribal Community Building	G	Offices	\$500,000	Ind. Lumber contractor
16	Airport Building	G	Airport	\$500,000	DOT-Pam Miller
17	UUI Building + Antenna	U	Telephone	\$1,317,000	Marianne Turner UUI
18	Barge Landing	O	Harbor/Dock/Port	\$200,000	1 barge load riprap
19	Teen Center	C	Offices/Store	\$200,000	Ind. Lumber contractor
20	NIFCO	C	Store	\$25,000	CE2 Contractors
21	Power Lines	U	Power Generation Facility	\$500,000	AEA
22	Airport Runway	O	Airport	\$20,000,000	DOT-Pam Miller
23	Graveyards	R	Cemetery	Priceless	NIAPB
24	Causeway	O	Road	\$2,100,000	CE2 contractor
25	Airport Access Road	O	Road	\$750,000	Estimate (2009)
26	River Access Road	O	Road	\$290,409	CE2 contractor
27	Lagoon Access Road	O	Road	\$356,643	CE2 contractor
28	Boardwalks	O	Road	\$4,000,000	CE2 /ANTHC
32	Portable classroom	E	School	\$500,000	Estimate
33	Main Office/Gym/ K-1	E	School	\$2,000,000	Estimate
35	School Tanks	E	Fuel Storage Tanks	\$500,000	Estimate
36	New School site	E	School	\$13,918,000	Bering Pacific contract
37	City Dump	O	Landfill	\$50,000	Site estimate
38	Honey Bucket Utility	O	Waste Haul Utility	\$50,000	Lagoon estimate
39	Catholic Church	R	Church	\$200,000	Ind. Lumber contractor
40	Assembly of God Church	R	Church	\$200,000	Ind. Lumber contractor
41	Water/sewer piping	U	Water Sewer piping	\$4,800,000	Improvement plan

Class definitions: U=Utility, G=Government, R=Religious, HS=Health & Safety, C=Commercial, E=Education O=Other (Note: #29,#30,#31,#34 are not included as they are scheduled to be torn down after completion of the new school. #41 is under construction and #25 scheduled for construction therefore both are included.

9.2 Facilities Functional Value Chart

In this chart **Contents** is a % of structural value, based on classification: See **9.4 Community Functional Value Chart** details. Functional Value = the sum of Structural + Contents of the facility.

Class	Facility	Structural	Contents	Functional
C	City Hotel	\$205,000	\$307,500	\$512,500
C	Nunam Iqua Trading Post	\$1,000,000	\$1,500,000	\$2,500,000
C	Corporation Building	\$500,000	\$750,000	\$1,250,000
C	Teen Center	\$200,000	\$300,000	\$500,000
C	NIFCO	\$25,000	\$37,500	\$62,500
E	Portable classroom	\$500,000	\$750,000	\$1,250,000
E	Main Office/Gym/ K-1	\$2,000,000	\$3,000,000	\$5,000,000
E	School Tanks	\$500,000	\$750,000	\$1,250,000
E	New School site	\$13,918,000	\$20,877,000	\$34,795,000
G	City Office	\$200,000	\$300,000	\$500,000
G	Tribal Community Building	\$500,000	\$750,000	\$1,250,000
G	Airport Building	\$500,000	\$750,000	\$1,250,000
HS	Nunam Iqua Tribal Clinic	\$907,509	\$1,361,264	\$2,268,773
HS	Code Blue	\$15,000	\$22,500	\$37,500
HS	Code Red	\$35,000	\$52,500	\$87,500
HS	Police Dept.	\$200,000	\$300,000	\$500,000
O	Barge Landing	\$200,000	\$0	\$200,000
O	Airport Runway	\$20,000,000	\$0	\$20,000,000
O	Causeway	\$2,100,000	\$0	\$2,100,000
O	Airport Access Road	\$750,000	\$0	\$750,000
O	River Access Road	\$290,409	\$0	\$290,409
O	Lagoon Access Road	\$356,643	\$0	\$356,643
O	Boardwalks	\$4,000,000	\$0	\$4,000,000
O	City Dump	\$50,000	\$0	\$50,000
O	Honey Bucket Utility	\$50,000	\$0	\$50,000
R	Catholic Church	\$200,000	\$200,000	\$400,000
R	Assembly of God Church	\$200,000	\$200,000	\$400,000
U	Washeteria/Waterplant	\$2,600,000	\$0	\$2,600,000
U	Gravel Pad Water/Wash	\$568,000	\$0	\$568,000
U	Water Tank	\$636,000	\$0	\$636,000
U	Sewage Lagoon	\$1,819,189	\$0	\$1,819,189
U	Power Plant	\$2,000,000	\$0	\$2,000,000
U	Tank Farms	\$2,000,000	\$0	\$2,000,000
U	UUI Building + Antenna	\$1,317,000	\$524,000	\$1,841,000
U	Power Lines	\$500,000	\$0	\$500,000
U	Water/sewer piping	\$4,800,000	\$0	\$4,800,000
	TOTALS	\$65,642,750	\$32,732,264	\$98,375,014

9.3 Residential Structural Value Chart

This chart demonstrates the structural value of the community houses

# Bedrooms	Structural value	# Houses	Total Structural value
1	\$199,284	11	\$2,192,124
2	\$213,028	12	\$2,556,336
3	\$226,772	19	\$4,308,668
4	\$302,363	5	\$1,511,815
5	\$377,954	1	\$377,954
			\$10,946,897

Replacement residential values for 2,3,4 bedrooms were provided by AVCPHA.
Itinerant Apartment not included as it will be abandoned.

9.4 Community Functional Value Chart

This Chart summarizes the total Functional Value of the Critical and Non-Critical Facilities. Contents are calculated as a percentage of the Structural Value, with the percentage dependent upon the classification of the facility. Percentages were derived from the FEMA HAZUS-Multi-Hazard software program.

Class	Type of Structure	Structural	Content%	Content	Functional
R	Residential	\$10,946,897	50%	\$5,473,449	\$16,420,346
C	Commercial	\$1,930,000	150%	\$2,895,000	\$4,825,000
O	Other	\$27,797,052	0%	0	\$27,797,052
R	Religious	\$400,000	100%	\$400,000	\$800,000
G	Government	\$1,200,000	150%	\$1,800,000	\$3,000,000
E	Education	\$16,918,000	150%	\$25,377,000	\$42,295,000
HS	Health & Safety	\$1,157,509	150%	\$1,736,264	\$2,893,773
U	*Utilities	\$16,240,189	0%	\$524,000	\$16,764,189
	Total	\$76,589,647		\$38,205,712	\$114,795,359

*Does not include the price of fuel stored in the Tank Farm and does include UUI content based on reported value.

9.5 Flood and Erosion Vulnerability for Housing and Facilities

According the U.S. Army Corps of Engineers, Nunam Iqua has a VERY HIGH flood hazard and erosion is increasing. To comply with federal standards, structures are required to be constructed one foot above the 1972 flood of record. The first floor must be elevated to 8' Mean Sea Level (MSL). The US Army Costs of Engineers surveyed the elevation of the grating at the front door of the LYSD (old school) at 14.3' MSL. Elevations were determined using a Garmin GPSmap76 and extrapolating from the COE school measurement.

Proximity to the river bank was used to identify structures vulnerable to the erosion hazard.

9.5.1 Elevation and River Proximity Chart

#	Residential Housing	Elevation In feet	River <500 feet
14	June Camille		
16	Josephine Charlie		
15	Aloysius Adonis		
13	Daryl Manumik		
11	Vanessa Hunter		
10	Mary Stuart		
12	Agatha Paukan		
42	Johanna Murphy		
43	Segundo Strongheart		
9	Eugene Pete		
8	Justin Ignatius		
7	Margaret Shelton		X
6	Donna O'Malley		X
5	Joseph P Strongheart		X
4	Alphonsus Pete		
3	Edith Johnson		
2	Francine Afcan		
1	Rosalie Raphael		X
X	John Camille's house		X
X	Joseph Afcan's house		X
40	Frank Camille's House		X
41	John Canoe		X
38	Andrew Stern		X
19	James O'Malley		
20	Mildred Camille		
21	J. Shelton's House		
22	Cyril Murphy		
23	Roger Canoe, Sr.		
37	James Adams		
24	Julia Afcan		
25	Gloria Manumik		
X	Maggie J. Strongheart		
26	Irene Camille		
27	Patricia Ignatius		
28	Andrea Charlie		
29	Lucy M Camille		
31	Paul Manumik Jr		
30	Paul J. Manumik Sr		
32	Edward Adams Sr		
39	Elizabeth Adams		
33	Esther Sugar		
34	Joseph G. Strongheart		
35	Stanley Pete		
36	Martha Owletuck		
G	Teacher Housing (243)		X
G	Teacher Housing (241)		X
G	Teacher Housing (240)		
G	Teacher Housing (242)		X

#	COMMUNITY FACILITY	Elevation In feet	BASE	River <500 feet
1	Washeteria/Waterplant	10.89	Gravel	
2	Gravel Pad Water/Wash		Gravel	
3	Water Tank		Gravel	
4	Sewage Lagoon		Berms	
5	Nunam Iqua Tribal Clinic	11.79	Piling	
6	Code Blue		Post&Pad	
7	City Hotel	11.34	Post& pad	
8	Code Red		Post&Pad	
9	Police Dept.		Post&Pad	
10	Power Plant		Piling	
11	Nunam Iqua Trading Post	15.47	Post&Pad	
12	Corporation Building		Post&Pad	
13	Tank Farms		Gravel	X
14	City Office		Post&Pad	
15	Tribal Community Bldg		Piling	
16	Airport Building		Gravel	
17	UII Building		Piling	
18	Barge Landing		Gravel	X
19	Teen Center		Piling	
20	NIFCO		Pad&Post	X
21	Power Lines		"piling"	X
22	Airport Runway		Gravel	X
23	Graveyards		Tundra	
24	Causeway	7	Gravel	
25	Airport Access Road		Gravel	
26	River Access Road		Gravel	X
27	Lagoon Access Road	7	Gravel	
28	Boardwalks			X
29	School Shop		Piling	X
30	School Library		Pad&Post	
31	School Generator building		Piling	
32	Portable classroom	To be moved	Pad&Post	
33	Main Office/Gym/ K-1		Piling	
34	BIA Building		Piling	X
35	School Tanks		Piling	
36	New School building		Gravel	
37	City Dump		Tundra	
38	Honey Bucket Utility		Tundra	
39	Catholic Church		Pad&Post	X
40	Assembly of God Church		Pad&Post	X

At this time, not all facility elevations are known

When this information becomes available it will be incorporated as part of the update to this plan.

Please note: Facilities indentified in red will be

9.6 Anticipated Loss

The following chart shows the potential population that could be affected by each of the identified hazards as well as the Critical and Non-critical facilities structural and functional loss. The assumption is a worst case scenario. Dollars amounts represent the cost of replacement of structures in the community. This monetary amount does not include health care costs for injured residents nor potential earnings lost due to the disaster.

Anticipated Loss Chart

Hazard	Population Affected	Critical Facilities	Non-Critical Facilities	Structural Loss	Functional Loss
Severe Weather	100%	100%	100%	\$76,589,647	\$114,795,359
Landslide	100%	100%	100%	\$76,589,647	\$114,795,359
Erosion	*18% displaced	24%	30%	\$28,237,354	\$30,682,702
Technological	100%	100%	100%	\$8,136,000	\$8,214,000
Wildland Fire	100%	81%	100%	\$51,073,406	\$89,279,118
Economic	100%	100%	100%	\$76,589,647	\$114,795,359

Chart Comments and Clarification

Severe Weather: Storm surge and ivu could potentially destroy all structures in the community and would affect the entire population.

Landslide: The integrity of all community structures is dependent upon a secure foundation. Loss of permafrost would destabilize structures that have potential affect on the entire population.

Erosion: Although accelerated Long term Erosion could ultimately affect all community structures, the numbers are based only on structures located within 500 feet of the river bank. Estimates are 4750 feet of Boardwalks @ \$475/foot (\$2,256,250), Housing functional value (\$3,886,043), Barge Landing (\$200,000), River Access Road (\$290,409), Tank Farm (\$2,000,000), 2 churches (\$800,000), Airport Building (\$1,250,000), and Airport Runway (\$20,000,000). The percentage of population represents those residents that would be displaced by erosion, not those that would be affected by loss of infrastructure.

Technological: A hazardous waste spill and power outage, are a greater threat to the health and safety of residents than to the structures. Anticipated Loss due to a extended power outage could potentially cause the water sewer system to freeze and could require replacement of water sewer piping (\$4,800,000), waterplant (\$2,600,000), water tank (\$636,000): All perishable and canned inventory in the Nunam Iqua Trading Post, Washeteria, and Teen Center would be affected (\$30,000), as well as home owners (48 residences X \$1,000= \$48,000). Power Plant new generator installation (\$80,000), power pole/transformer rebuild (\$20,000) are likely in restoring power.

Wildland Fire: Wildland –Urban Interface fire would cause structural fires that, with inadequate fire prevention response, could potentially result in loss community structures excepting roads (\$3,497,052), runway (\$20,000,000), Barge landing (\$200,000), Sewage Lagoon (\$1,819,189).

Economic: Over time, rampant unpunished vandalism can result in damage to all facilities.

10.0 MITIGATION MEASURES

10.1 Mitigation Actions: The NIAPB selected the following mitigation actions to address the hazard mitigation strategies. Preliminary Project Scope was described. Responsible entities were identified and project timelines estimated.

ACTION	Lead Entity	Project Description and Scope	Term
Fall Storage Area	NIAPB	Select site, designate entity to operate..... Secure site control, and funding if necessary for materials.....	Short Long
Flood proof and Erosion proof properties (especially. houses located near the river bank)	TRIBE	Houses not on piling and potentially vulnerable to first floor flooding include: Houses #38 #40 #41-#42 #43 and all houses designated X in the listing for a total of 8 houses. Assist residents in applying for alternative housing...	Long
	CITY	Encourage residents to relocate structures by making available heavy equipment at an affordable rate.	Long
	TRIBE	Vulnerable Critical Facilities include Code Red-relocate or elevate.....	Short
	TRIBE	Graveyards-relocate or elevate.....	Long
Second Watertank	CITY	Included in the 2006 WaterSewer Improvement update plan- seek funding through VSW.....	Short
Land use policies	NIAPB	Review examples and make applicable to Nunam Iqua.....	Short
Emergency response team	TRIBE	Volunteers will be requested and selected to form a team.....	Short
Emergency response plan	NIAPB	Request funding from Homeland Security..... Develop plan.....	Short Long
Post disaster administrator	NIAPB	Designate entity. Select position responsible and include in their job description....	Short
Video flooding	NIAPB	Contact LYSD about using equipment and designate person.....	Short
Educate public on disaster/Fire Wise	NIAPB	Establish program, designate entity, and implement.....	Long
	TRIBE	Continue involvement in the FireWise program with emphasis on education..	Long
National Flood Insurance Program	NIAPB	Collect and review information on the NFIP. Present to the public for their comments. Make a recommendation on joining the program.....	Long
CPR , Code Red, Fire fight training & equipment	TRIBE	Contact appropriate agencies and request training. Develop a list of necessary equipment..... Hold training or send all emergency response personnel to training..... Seek funding, request donations, and hold fundraisers to buy equipment.....	Short Long Long
Foundation Elevations	CITY	Request certification of elevation for all new community facilities. Request certification or documentation on facilities during upgrades.	Long
Feasibility study on foundations	CITY	Find funding to consolidate information on failing community foundations to select optimal foundation for wetland construction.....	Long
Boardwalk/trails	CITY	Seek funding for boardwalks and trails to help maintain integrity of tundra.....	Long
Utility main.	CITY	Establish a back-up maintenance plan to ensure utility sustainability.....	Short
Back-up power source	CITY	Seek funding to install power lines from LYSD's old generator to the washeteria and clinic for back- up power.....	Long
Flood water hydro study	CITY	Work with UofA in Fairbanks and DOT on securing projected flood water flow data to determine appropriate culvert size for roads to minimize flood damage. Rebuild roads to meet those standards	Long
River bank erosion data	NIAPB	Collect historical and pictorial documentation on erosion to justify expenditures on construction of a seawall.....	Short
Seawall design and construction	CITY	Gather information of successful seawall designs in a similar environments... Seek funding and design of optimal erosion protection for Nunam Iqua Secure construction funding.....	Short Long
Public Safety Building and housing	TRIBE	Select location and secure funding for Public Safety Building..... Designate housing for VPO and or VPSO with new or old teacher's housing..	Long Long

10.2 Evaluation and Prioritization of Mitigation Actions

The NIAPB discussed the criteria for initial evaluation and prioritization of Mitigation actions. The mitigation actions were first divided according to the selected lead entity. Each mitigation action was discussed with consideration given to community support, technical feasibility, environmental impact, preliminary cost benefit analysis, and legality, as well as administrative ability. Ranking system was unanimous consensus. Project timeline was based on the scope of project and the availability of funding.

Nunam Iqua Advisory Planning Board

Rank	Description	Time line	Possible Funding Source
1A	Emergency Response Plan	3 years	Federal
1B	Post Disaster Administration	1 year	Local
2	Fall Storage Area	1-3 years	Local
3	Educate Public/Promote Fire Wise Program	1-3 years	Local
4	Land Use Policies (including educate public)	1-3 years	Local
5A	Video tape flooding (identify team to record disasters)	1 year	Local
5B	River bank erosion data	Continuous	Local

Native Village of Nunam Iqua

Rank	Description	Term	Possible Funding Source
1	Public Safety: TPB Building and housing	1-5 years	Federal
2A	Emergency Response Team	1 year	Local
2B	CPR, Code Red, fire fighting training & equipment	1-5 years	Local/Federal
3	Flood and erosion proof properties	1-5 years	Federal
4	Boardwalks & trails	1-5 years	Federal (BIA)

City of Nunam Iqua

Rank	Description	Term	Possible Funding Source
1A	Utility Maintenance	1 year	Local/State
1B	Critical facilities back-up power source	1-3 years	State
2	Second Water tank	1-3 years	State/Federal
3A	Feasibility study on foundation	1-3 years	State/Federal
3B	Elevations of foundations	1 year	Local
4A	Flood water hydro study	1-5 years	State/Federal
4B	Seawall design and construction grant	1-10 years	State/Federal

10.3 Cost Benefit Analysis

Further cost benefit analysis will be done once accurate financial cost estimates are secured. Only mitigation options with essentially no cost can be accurately assessed at this time. With accurate funding estimates, each action will be measured by the NIAPB, using the following factors to prioritize:

1. Extent the project reduces risk to life.
2. Extent to which benefits are maximized when compared to the costs of the project.
3. Project protects critical facilities or critical city functionality.
 - A. Hazard Probability
 - B. Hazard severity

For actions to be cost effective, the Benefit Cost Ratio must be greater than or equal to one.

11.0 PLAN MAINTENANCE PROCEDURES

Implementation of the Nunam Iqua Hazard Mitigation Plan will be overseen by the Nunam Iqua Advisory Planning Board. For the November meetings of the City, and Tribe, the NIAPB administrator sends a sample resolution (for appointing the NIAPB representative) and a list of capital projects to be prioritized (The specific capital projects listed are documented in the 2005 Nunam Iqua Strategic Plan for Comprehensive Development. With approval of the Nunam Iqua Hazard Mitigation Plan 2008, the new councils will be given a list of their mitigation actions and a request for comment on their status. This process will serve as an introduction of the needed actions for new members, and a reminder for retained members. The status of the actions will be signed and returned to the NIAPB. A copy will be placed with the Nunam Iqua Hazard Mitigation Plan.

The Nunam Iqua Strategic Plan for Comprehensive Development was completed in 2005. Since all potential outside forces cannot be known and no future elected officials should be limited in their ability to make changes, the elected officials supporting the comprehensive plan decided that a review process could be initiated by resolution at any time. This policy would also apply to the Nunam Iqua Hazard Mitigation Plan 2008. Formal review of the hazard plan would be done in conjunction with the comprehensive plan. This is to ensure that mitigation strategies are implemented in all future development.

PLAN	COMPLETION DATE	FORMAL REVIEW	FUNDING
Strategic Plan for Comprehensive Community Development	2005	2010	Local (NIAPB)
Hazard Mitigation	2008	2010	Local (NIAPB)

The Nunam Iqua Water Sewer Improvement Plan Update was completed in 2006. This plan details construction through 2010. The NIAPB had begun Mitigation Planning prior to completing the Nunam Iqua Utility Business Plan 2007, and the Nunam Iqua Long Range Transportation Plan 2008. These plans are subject to decisions incorporated into the Strategic Plan for Comprehensive Community Development. A review of the Nunam Iqua Hazard Mitigation Plan will be included in any future updates of these plans.

Community planning and development in Nunam Iqua is overseen by the NIAPB. Time and place of all NIAPB meetings and work sessions are posted to encourage public participation.

APPENDIXES ON DISK

Appendix A- Hazard Identification

Appendix B-Community Profile

Appendix C–Population/Economics

Appendix D- Regional Organizations

Appendix E- Strategic Development Plan

Appendix F-Benefit-cost Analysis Fact Sheet

Appendix G- Glossary of Terms